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EASTERN GULF OF ALASKA

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FINAL ENVIRONMENTAL IMPACT STATEMENT

ALASKA OUTER CONTINENTAL
SHELF OFFICE
OIL & GAS LEASE SALE

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Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

GRAPHIC NO. 1

ENVIRONMENTAL GEOLOGY

Bureau of Land Management
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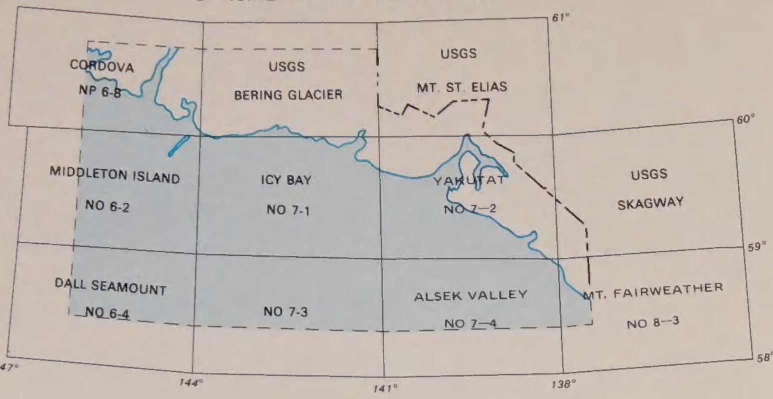
Denver Service Center

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS

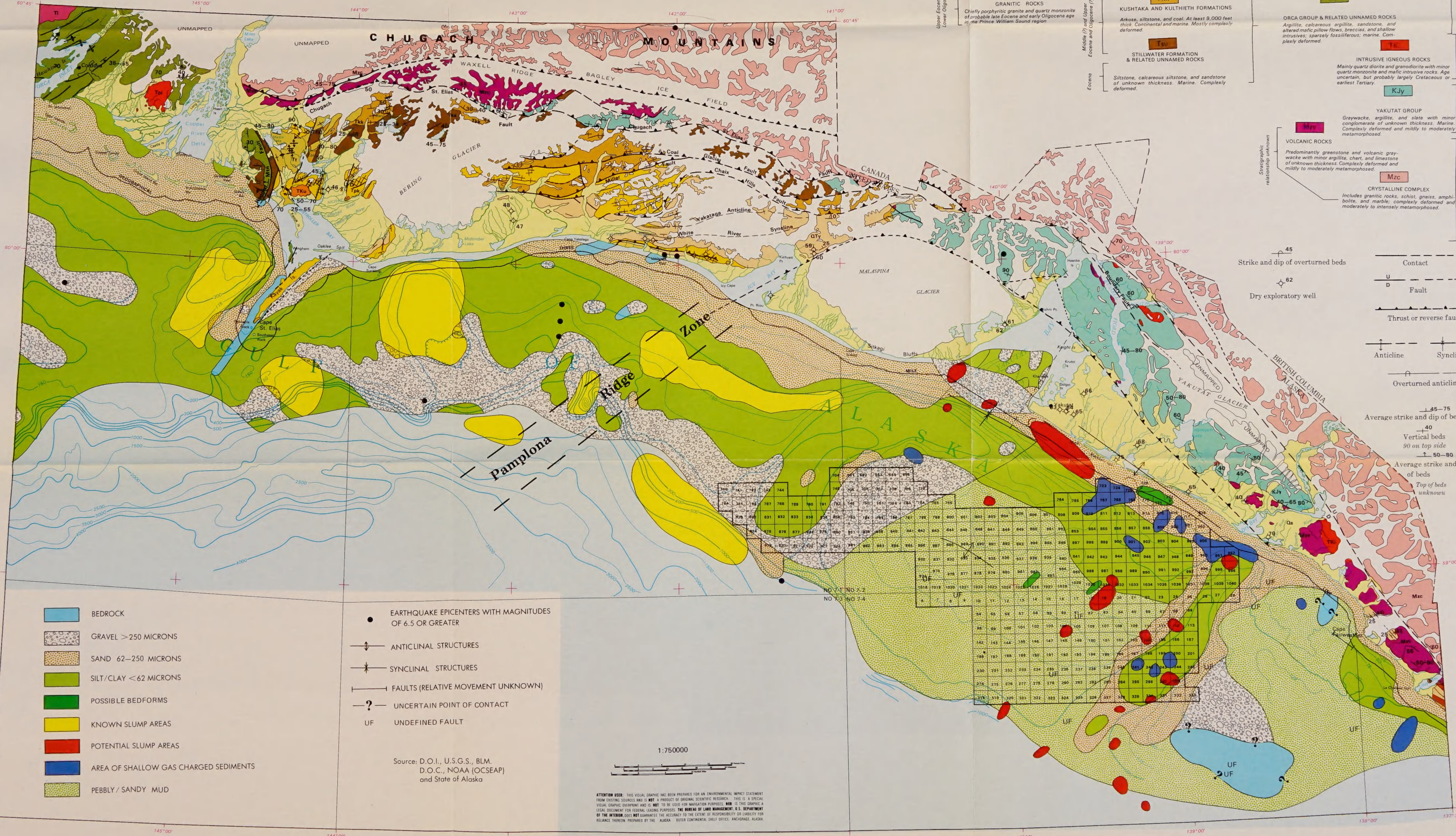


LOCATION MAP

Recent	**Qs** SURFICIAL DEPOSITS *Alluvial, glacial, lacustrine, and beach deposits.* *UNCONFORMITY*	QUATERNARY
Middle Miocene to Lower Pleistocene	**QTy** YAKATAGA FORMATION *Mudstone, siltstone, sandstone, and minor conglomerate interbedded with abundant conglomeratic sandy mudstone (tillite) characterized by unsorted, striated, and faceted clasts of diverse lithologies. Composite thickness about 16,500 feet. Marine* *LOCAL UNCONFORMITY*	TERTIARY AND QUATERNARY

Lower (?) and Middle (?) Miocene	**Tpi** PORPHYRITIC INTRUSIVE IGNEOUS ROCKS *Predominantly porphyritic felsic plugs of post-middle Katalla age in the Katalla district.*	
Middle (?) and Upper Oligocene and Lower Miocene	**Tku** UPPER PART OF KATALLA FORMATION *Pebbly siltstone, siltstone, pebble conglomerate, and sandstone at least 9,200 feet thick. Marine.*	
	Tpk POUL CREEK FORMATION & MIDDLE & LOWER PART OF KATALLA FORMATION *Calcareous siltstone with minor sandstone, glauconite, and pyroclastic volcanic rocks. Thickness from 3,200 to 6,100 feet. Marine.* *UNCONFORMITY (?)*	
	Tt TOKUN FORMATION *Interbedded sandstone and concretionary siltstone in upper part; mainly concretionary siltstone in lower part. Between 1,100 and 3,500 feet thick. Marine. Mostly complexly deformed.*	
Upper Eocene and Lower Oligocene	**Ti** GRANITIC ROCKS *Chiefly porphyritic granite and quartz monzonite of probable late Eocene and early Oligocene age in the Prince William Sound region*	
Middle (?) and Upper Eocene and Oligocene (?)	**Tkk** KUSHTAKA AND KULTHIETH FORMATIONS *Arkose, siltstone, and coal. At least 9,000 feet thick. Continental and marine. Mostly complexly deformed.*	
Eocene	**Tsu** STILLWATER FORMATION & RELATED UNNAMED ROCKS *Siltstone, calcareous siltstone, and sandstone of unknown thickness. Marine. Complexly deformed.*	
	Ttc TOPSY FORMATION AND CENOTAPH VOLCANICS (new name)	TERTIARY
	To ORCA GROUP & RELATED UNNAMED ROCKS *Argillite, calcareous argillite, sandstone, and altered mafic pillow flows, breccias, and shallow intrusives; sparsely fossiliferous; marine. Complexly deformed.*	TERTIARY
	TKi INTRUSIVE IGNEOUS ROCKS *Mainly quartz diorite and granodiorite with minor quartz monzonite and mafic intrusive rocks. Age uncertain, but probably largely Cretaceous or earliest Tertiary.*	CRETACEOUS OR TERTIARY
	KJy YAKUTAT GROUP *Graywacke, argillite, and slate with minor conglomerate of unknown thickness. Marine. Complexly deformed and mildly to moderately metamorphosed.*	JURASSIC(?)AND CRETACEOUS
Stratigraphic relationship unknown	**Mzv** VOLCANIC ROCKS *Predominantly greenstone and volcanic graywacke with minor argillite, chert, and limestone of unknown thickness. Complexly deformed and mildly to moderately metamorphosed.*	MESOZOIC AND OLDER (?)
Stratigraphic relationship unknown	**Mzc** CRYSTALLINE COMPLEX *Includes granitic rocks, schist, gneiss, amphibolite, and marble; complexly deformed and moderately to intensely metamorphosed.*	MESOZOIC AND OLDER (?)

45	Strike and dip of overturned beds
62	Dry exploratory well
U D	Fault
	Contact
	Thrust or reverse fault
	Anticline
	Syncline
	Overturned anticline
45–75	Average strike and dip of beds
40	Vertical beds *90 on top side*
50–80	Average strike and dip of beds *Top of beds unknown*



🟦	BEDROCK
▨	GRAVEL >250 MICRONS
▨	SAND 62–250 MICRONS
🟩	SILT/CLAY <62 MICRONS
🟩	POSSIBLE BEDFORMS
🟨	KNOWN SLUMP AREAS
🟥	POTENTIAL SLUMP AREAS
🟦	AREA OF SHALLOW GAS CHARGED SEDIMENTS
▨	PEBBLY / SANDY MUD

●	EARTHQUAKE EPICENTERS WITH MAGNITUDES OF 6.5 OR GREATER
	ANTICLINAL STRUCTURES
	SYNCLINAL STRUCTURES
	FAULTS (RELATIVE MOVEMENT UNKNOWN)
—?—	UNCERTAIN POINT OF CONTACT
UF	UNDEFINED FAULT

Source: D.O.I., U.S.G.S., BLM.
D.O.C., NOAA (OCSEAP)
and State of Alaska

1:750000

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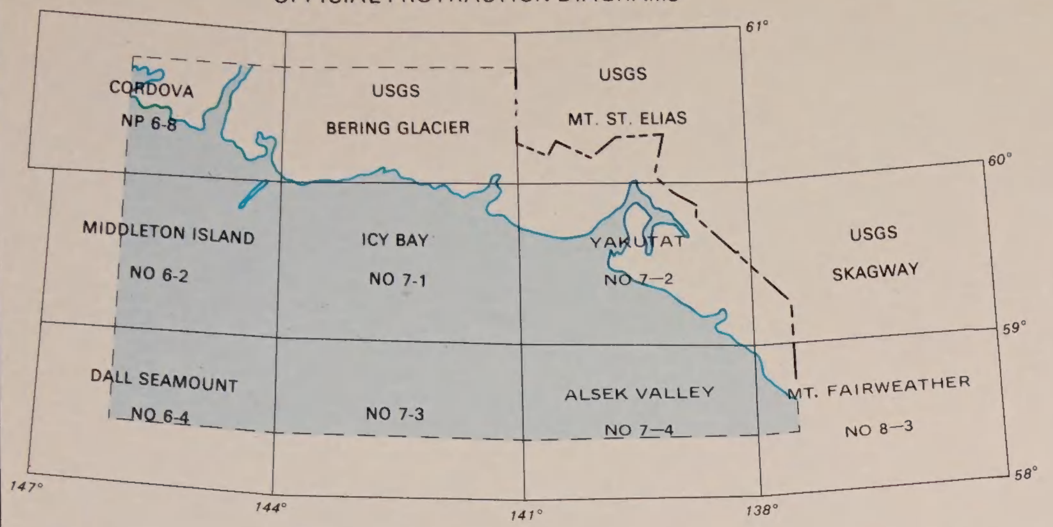

LOCATION MAP

Qs

SURFICIAL DEPOSITS
Alluvial, glacial, lacustrine, and beach deposits.

UNCONFORMITY

Recent

QUATERNARY

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YAKATAGA FORMATION
Mudstone, siltstone, sandstone, and minor conglomerate interbedded with abundant conglomeratic sandy mudstone (tillite) characterized by unsorted, striated, and faceted clasts of diverse lithologies. Composite thickness about 16,500 feet. Marine

Middle Miocene to Lower Pleistocene

TERTIARY AND QUATERNARY

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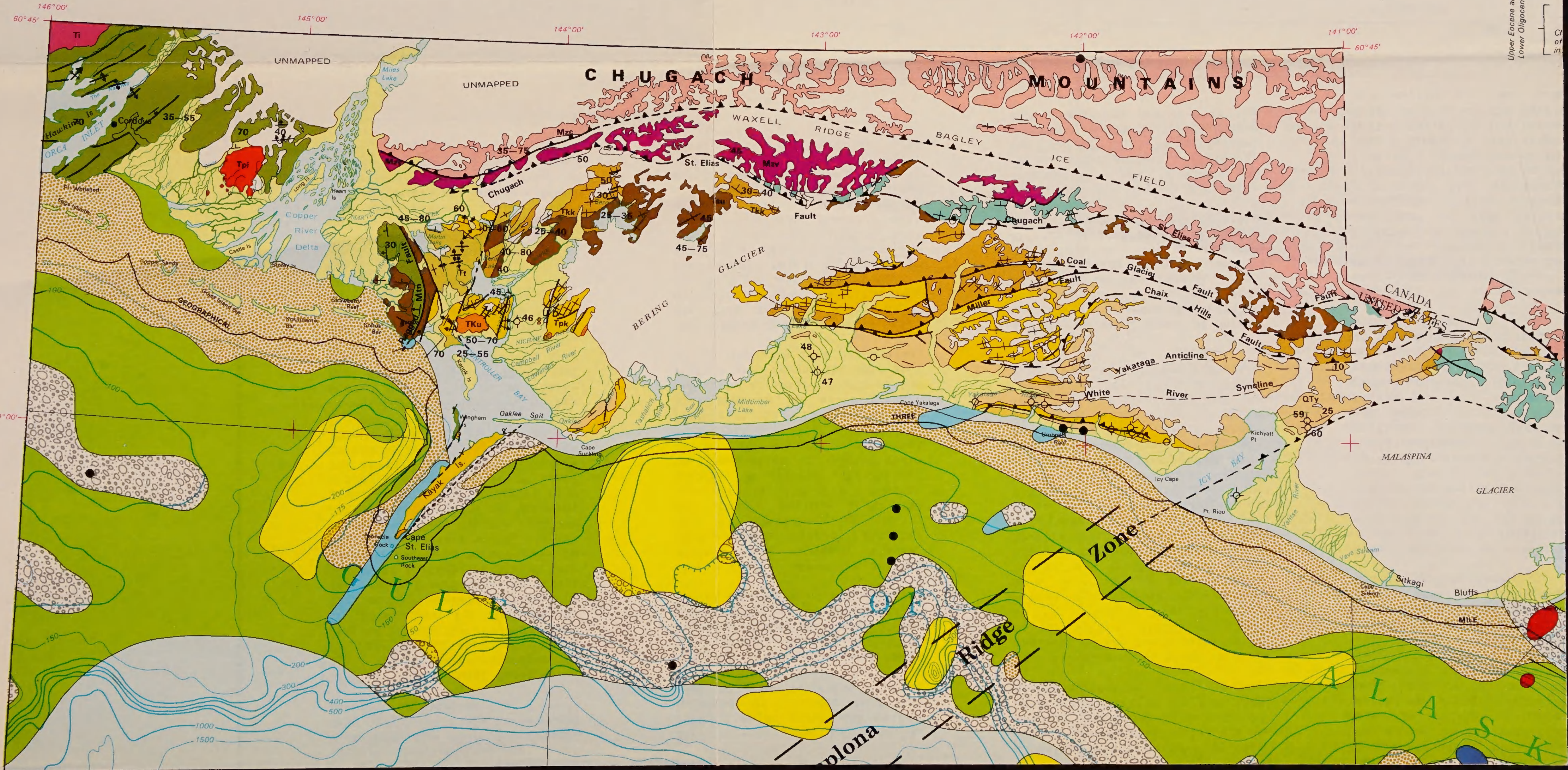
Lower (?) and Middle (?) Miocene

Middle (?) and Upper Oligocene and Lower Miocene

Upper Eocene and Lower Oligocene



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UREAU OF LAND MANAGEMENT

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Tku

UPPER PART OF KATALLA FORMATION

Pebbly siltstone, siltstone, pebble conglomerate, and sandstone at least 9,200 feet thick. Marine.

Tpk

POUL CREEK FORMATION & MIDDLE & LOWER PART OF KATALLA FORMATION

Calcareous siltstone with minor sandstone, glauconite, and pyroclastic volcanic rocks. Thickness from 3,200 to 6,100 feet. Marine.

UNCONFORMITY (?)

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INTRUSIVE IGNEOUS ROCKS

Mainly quartz diorite and granodiorite with minor quartz monzonite and mafic intrusive rocks. Age uncertain, but probably largely Cretaceous or earliest Tertiary.

CRETACEOUS OR TERTIARY

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YAKUTAT GROUP

Graywacke, argillite, and slate with minor conglomerate of unknown thickness. Marine. Complexly deformed and mildly to moderately metamorphosed.

JURASSIC(?)AND CRETACEOUS

Stratigraphic relationship unknown

Mzv

VOLCANIC ROCKS

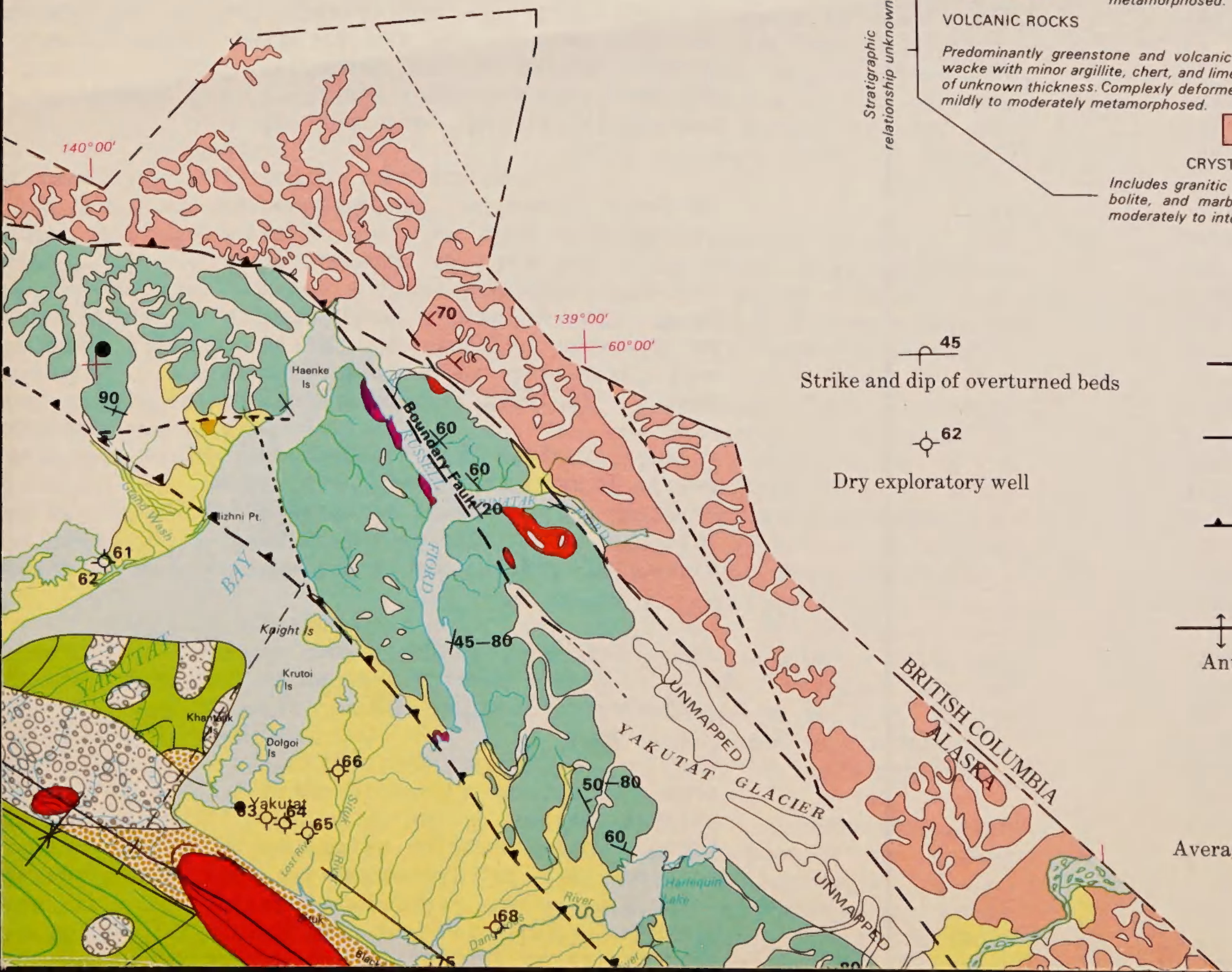
Predominantly greenstone and volcanic graywacke with minor argillite, chert, and limestone of unknown thickness. Complexly deformed and mildly to moderately metamorphosed.

Mzc

CRYSTALLINE COMPLEX

Includes granitic rocks, schist, gneiss, amphibolite, and marble; complexly deformed and moderately to intensely metamorphosed.

MESOZOIC AND OLDER (?)



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Thrust or reverse fault

Anticline

Syncline

Overturned anticline

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90 on top side

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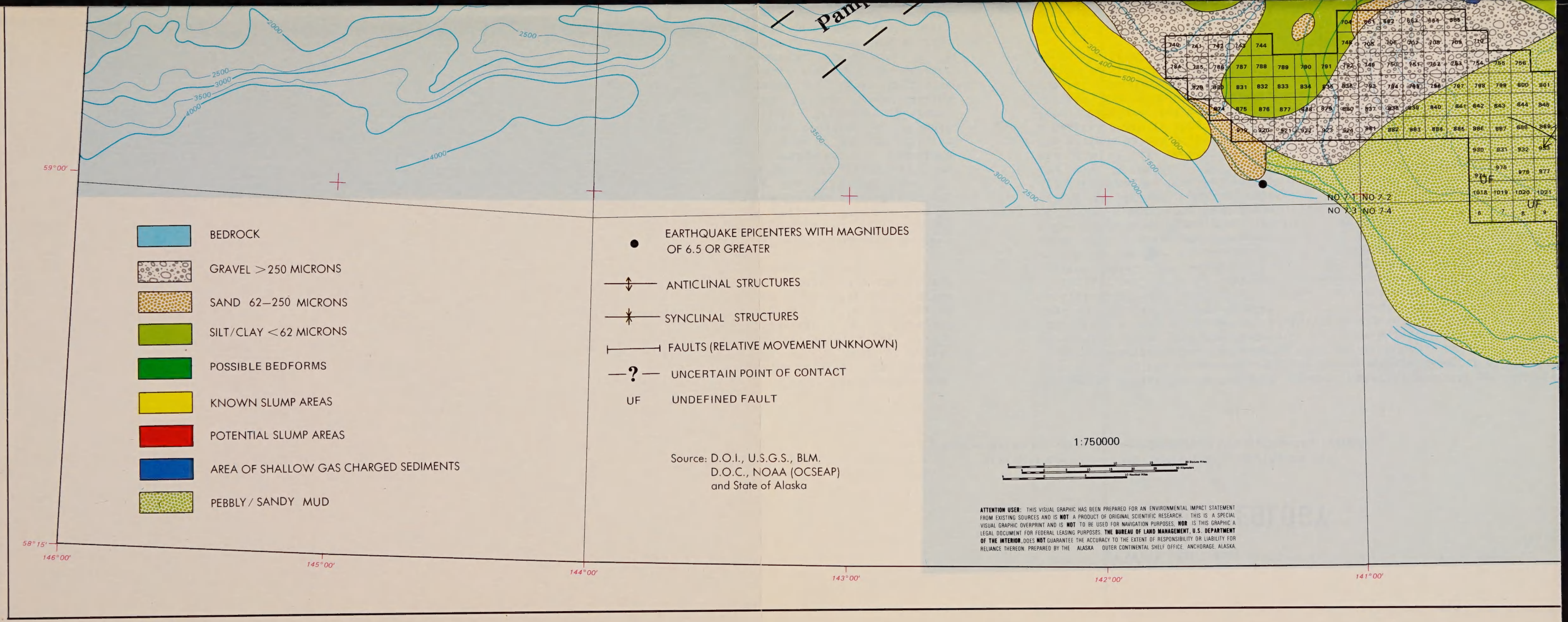

🟦 BEDROCK

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Source: D.O.I., U.S.G.S., BLM.
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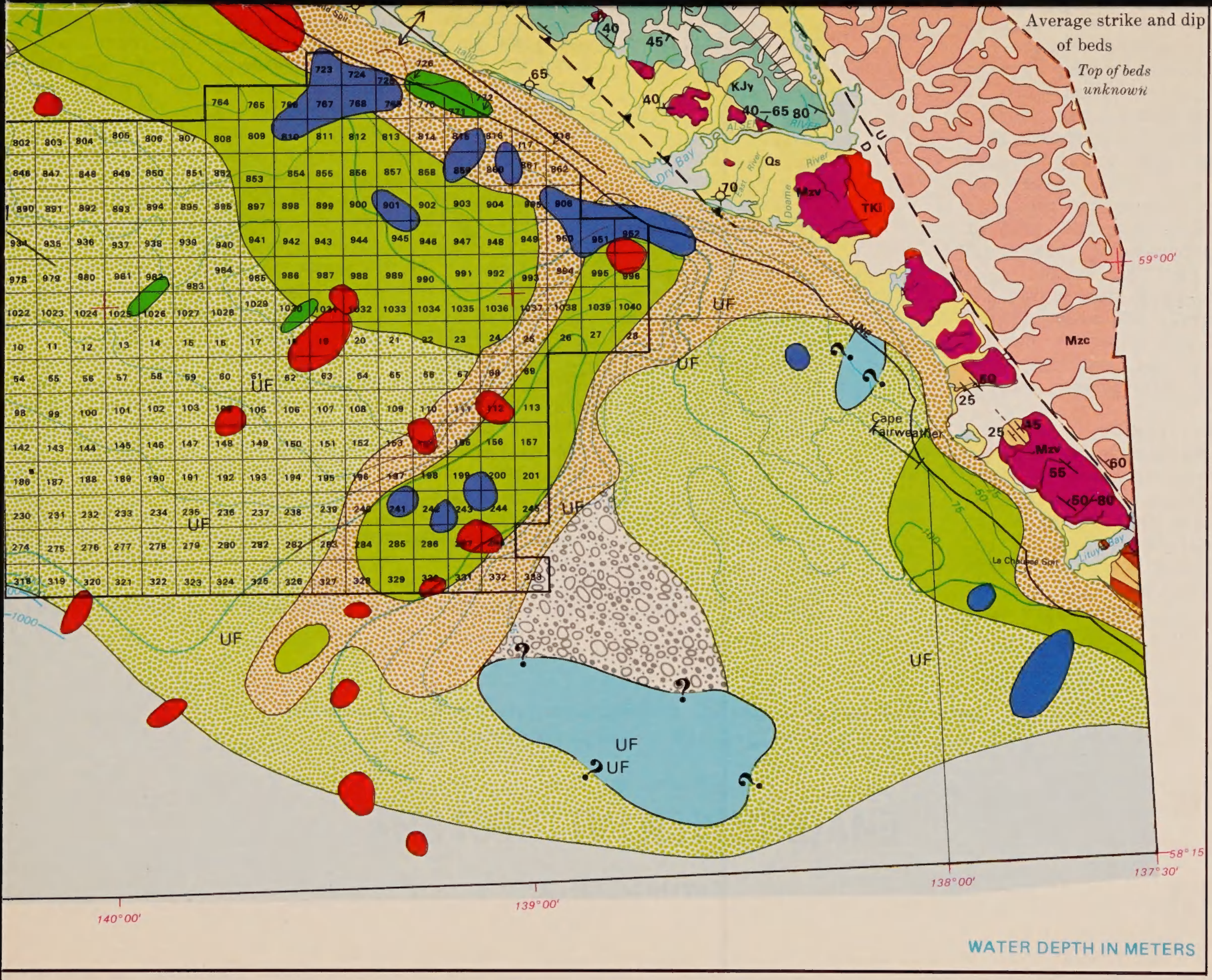

Average strike and dip of beds
Top of beds unknown
59°00'
58°15'
137°30'
138°00'
139°00'
140°00'
WATER DEPTH IN METERS
Mzc
Mzv
TKi
KJy
Qs
UF
Cape Fairweather
Dry Bay
Alsek River
East River
Doame River
Lituya Bay
La Chaussee Spit
U
D
1000
100
75
50
40
45
65
70
80
25
55
60
40–65
50–80

GRAPHIC NO. 1

ENVIRONMENTAL GEOLOGY

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Affected Environmental Conditions on Offshore Oil and Gas Operations

II.A.1.
Environmental Geology

a. Physiography: The proposed lease area is located on the continental shelf between the Yakutat Sea Valley to the north and the Alsek River Canyon to the south (see graphic). The St. Elias Mountains lie to the east. The northwest corner of the proposed lease area extends westward to the 300-meter isobath and the southwest corner extends to the 500-meter isobath.

The topography gently slopes to the west about 2.6 m/km. Fairweather Ground lies about 46 km southwest of Lituya Bay and covers about 647 km within the 100-m isobath.

The Alsek River Canyon is a prominent submarine valley trending southwest with an average width of 16 km and a maximum water depth of 73 m. The Yakutat Canyon is a submarine valley trending southwest from the mouth of Yakutat Bay, and is 11 to 16 km wide and about 96 km long.

b. Yakutat Shelf Geology: The proposed lease area lies in the Yakutat district of the Gulf of Alaska Tertiary Province. The Lituya district lies just to the south. Details concerning the regional structure and stratigraphy of the Gulf of Alaska Tertiary Province may be found in the final environmental impact statement (FEIS) for the northern Gulf of Alaska. On the basis of limited public information, only a single domal structure of about 246 km of closure has been identified in the proposed lease area (Dames and Moore, 1979).

Stratigraphy of the Fairweather Ground suggests it to be a basement high outcrop area with a not too thick, relative to OCS sale 39 area, Upper Tertiary section. There have been no significant signs of oil or gas in any of the early onshore exploration wells in the Yakutat district.

Very recent information from OCSEAP field work by B. Molnia and P. Carlson of the USGS has made available much of the potential geohazard and bottom sediment distribution information shown on the graphic in the proposed lease area.

c. Earthquakes and Associated Hazards: The Yakutat district of the Gulf of Alaska Tertiary Province is part of the circum-Pacific Ring of Fire and Earthquakes. It is also one of the more seismically active areas of the United States except for the Aleutian Islands.

Much of the earthquake history and tectonics of the Gulf of Alaska Tertiary Province can be found in Plafker and other (1975) and in the FEIS for sale 39. During the last 75 years, five major earthquakes of magnitude 7.8 or greater on the Richter Scale have occurred in the Gulf of Alaska Tertiary Province. Included is the great Alaska earthquake of 1964 (magnitude 8.5) whose epicenter was located in Prince William Sound. It is generally considered that a large magnitude earthquake could occur in the "seismic gap" between Prince William Sound and Icy Bay.

More recently, on February 28, 1979, a major earthquake with a magnitude of 7.7 occurred northwest of the Malaspina Glacier (Lahr et. al., 1979). The effects of this earthquake were most noticeable in the city of Yakutat, although damage was negligible. Epicenters for the major earthquakes are shown on the graphic.

Figure II.A.1. shows the seismic network for southern Alaska. Accelerograph records obtained from GS instrumentation at Icy Bay show a maximum horizontal acceleration of 0.17 g. Lamont-Doherty Geological Observatory Instrumentation at Yakutat indicated a maximum horizontal acceleration of 0.07 g, according to Lahr et. al. (1979). The stippled area on the above graphic shows the estimated extent of the rupture area around the epicenter of the February 1979 earthquake.

The Yakutat district is in seismic risk zone 3, where major damage may occur with earthquakes in the magnitude range of 6.0 to 8.8. Such physical damage to facilities either offshore or onshore can be attributed to tsunamis, landslides, ground breaking, and shaking due to surface seismic vibrations, avalanches, mud flows due to liquifaction of soils, differential settlement, and seismically induced glacial lake breakouts.

Tsunamis: Damage due to tsunamis is a result of the amount and rate of surface deformation, the stage of coastal tides, and the degree of influence that the geometry of bays and estuaries have on the amplification and concentration of seismic sea waves in confined coastal areas. The tsunamis generated by the 1964 Alaska earthquake cost 20 lives and considerable destruction along the Gulf of Alaska's coastline from Kayak Island to Kodiak. Because the occurrence of the tsunamis was at low tide at Kodiak, the damage and loss of life was minimized. The maximum height of tsunamis on a coastal beach is about 33 m (100 ft). Therefore, for maximum protection from potential tsunamis, coastal development facilities should be located at least 33 m above sea level.

Mass Movement: Landslides may occur due to seismically induced soil liquifaction and subsequent slumping either onshore or offshore. The foundation failure of coastal facilities in Valdez and Seward was induced by the 1964 Alaska earthquake.

Identified areas of slump or slide features on the continental shelf of the Gulf of Alaska are shown on the graphic. The Icy Bay-Malaspina slump (see graphic) has been described by Paul Carlson (1978), and is the closest known slump to the proposed lease area. Results of this study suggest that (1) submarine mass movement can occur on very gentle slopes of 0.5 degree or less, (2) sediments up to 40 m in thickness may be affected (e.g., sub-seabed pilings or foundations may be affected 40 m deep), (3) this particular submarine slump has grown in a landward direction, and (4) earthquakes have probably caused this slump of Holocene clay-like silt.

A number of small areas of potential unstable bottom sediments in and near the proposed lease area are shown on the graphic. Any facility siting, such as pipelines, would have to study closely the effects of such potential slumps on any proposed offshore facility.

Avalanches are a form of earthquake-related mass movement not readily recognized. Following the February 28, 1979 earthquake, northwest of the Malaspina Glacier, snow avalanches occurred to the southeast of the epicenter on the northern sides of Mt. Huxley, Mt. St. Elias, and Mt. Augusta, and to a lesser degree, on the southside of Mt. Logan and King Peak, (Lahr, et.al., 1979). No rock avalanches have been identified thus far. Yakutat Bay area residents have indicated that no avalanches, shoreline changes, or fault breaks were noticeable from the air.

Ground Shaking and Breaking: Ground shaking is caused by the passage of surface seismic vibrations. These vibrations can cause considerable damage to buildings which are located on unconsolidated water-saturated soils. Structural damage may be further amplified when the period of ground vibration is the same or nearly so as the period of the earthquake. If the vibration period of a building or other facility is about the same as the period of the earthquake and the ground vibration, then structural damage may be far more than that normally anticipated for a given earthquake's magnitude. The resonant frequency for large offshore structures occurs in the frequency range of 0.2 to 1.0 HZ. Ground shaking caused considerable structural damage during the 1964 earthquake in Anchorage, Cordova, Homer, Seward, Valdez, Kodiak, McCord, and Whittier.

Ground breakage or severe ground cracking and differential subsidence affected the entire Gulf of Alaska coast as far east as Yakutat Bay during the 1964 earthquake. Most ground fissures occur in thick, coarse-grained, consolidated sediments. Well drained surficial deposits generally do not develop extensive fissures. Bedrock is less susceptible to ground breakage. In offshore regions, areas of thick sediments, deposits, and slopes of 0.5 degree or more have a high potential for ground failure.

Faulting: The graphic shows the major late Cenozoic faults. Movements along faults are a function of the occurrence of earthquakes. Thatcher and Plafker (1977) have described the 1899 Yakutat Bay earthquake, during which time a tilting of the regional ground surface occurred over an area of 1500 km^2. Seven meters of horizontal (right-lateral slip) movement occurred on the Fairweather Fault because of the 1958 Lituya Bay earthquake (see graphic).

Molnia and others (1976) have mapped numerous shallow sub-bottom faults in the Gulf of Alaska; however, few faults have clearly offset Holocene sediments.

The shallow faults that cut through Holocene sediments to the surface of the seabed offer a potential natural hazard comparable to the shallow fault along which the Santa Barbara blowout occurred. A number of near-surface faults have been shown on the graphic on the basis of recent field work by Molnia and Carlson of the USGS. Unless a fault actually cuts the seabed and has been determined to be active, i.e., still capable of movement, then most such inactive near-surface, shallow faults are not considered to be extremely hazardous and may be readily mitigated either by well design, drilling procedures, or well location. Despite the scarcity of surface-cut shallow faults, the relatively high frequency of earthquakes in the Gulf of Alaska suggests that potential future differential movements of the seafloor are still quite probable. Thus, the risk of a surface-shallow fault occurring on the OCS must still be considered.

Gas-Charged Sediments: High-pressured, gas-charged sediments exist in the proposed lease area (see graphic).

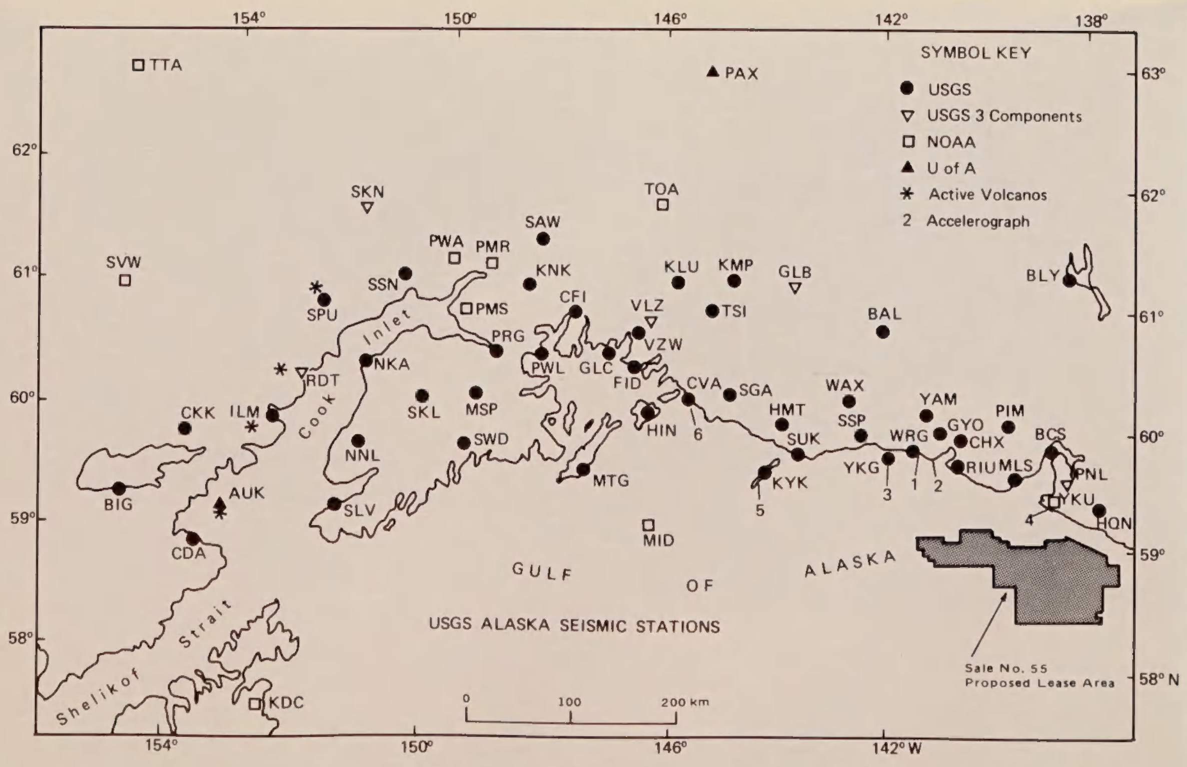
Shallow, gas-charged sediments suggest that appropriate drilling procedures be adopted in drilling into sediments containing either thermogenic or biogenic gases.

Other Potential Hazards: Some bedforms, which are like sand dunes, are located about 5 km from shore south of the Situk River. These bedforms which can be as high as 10 m and 1,000 m long, may pose some geotechnical problems to offshore pipeline routes (see graphic).

In addition, Molnia (1976 and 1977) has suggested that some geotechnical hazards may be present in Icy Bay due to high rates of sedimentation, and that submarine glacial moraines and buried ice offshore may be present offshore of the mouth of Yakutat and Icy Bay, Lituya Bay, Malaspina Glacier, and Cross Sound.

Post and Maya (1971) have described the potential for onshore glacial lake breakouts.

Figure II. A. 1.



Source: Lahr and Plafker, 1979

Seismic network in southern Alaska, as well as the closest accelerograph stations to the earthquake of February 28, 1979.

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Mass Movement: Landslides may occur due to seismically induced soil liquifaction and subsequent slumping either onshore or offshore. The foundation failure of coastal facilities in Valdez and Seward was induced by the 1964 Alaska earthquake.

Identified areas of slump or slide features on the continental shelf of the Gulf of Alaska are shown on the graphic. The Icy Bay-Malaspina slump (see graphic) has been described by Paul Carlson (1978), and is the closest known slump to the proposed lease area. Results of this study suggest that (1) submarine mass movement can occur on very gentle slopes of 0.5 degree or less, (2) sediments up to 40 m in thickness may be affected (e.g., sub-seabed pilings or foundations may be affected 40 m deep), (3) this particular submarine slump has grown in a landward direction, and (4) earthquakes have probably caused this slump of Holocene clay-like silt.

A number of small areas of potential unstable bottom sediments in and near the proposed lease area are shown on the graphic. Any facility siting, such as pipelines, would have to study closely the effects of such potential slumps on any proposed offshore facility.

Avalanches are a form of earthquake-related mass movement not readily recognized. Following the February 28, 1979 earthquake, northwest of the Malaspina Glacier, snow avalanches occurred to the southeast of the epicenter o
northern sides of Mt. Huxley
St. Elias, and Mt. Augusta
to a lesser degree, on the s
side of Mt. Logan and King
(Lahr, et.al., 1979). No
avalanches have been ident
thus far. Yakutat Bay area
dents have indicated that no
lanches, shoreline changes
fault breaks were noticeable
the air.

Ground Shaking and Breaking:
Ground shaking is caused b
passage of surface seismic v
tions. These vibrations can
considerable damage to buil
which are located on uncon
dated water-saturated s
Structural damage may be fu
amplified when the perio
ground vibration is the sa
nearly so as the period o
earthquake. If the vibr
period of a building or othe
cility is about the same a
period of the earthquake an
ground vibration, then struc
damage may be far more than
normally anticipated for a
earthquake's magnitude. The
nant frequency for large off
structures occurs in the fre
range of 0.2 to 1.0 HZ. G
shaking caused considerable
tural damage during the
earthquake in Anchorage, Co
Homer, Seward, Valdez, Ko
McCord, and Whittier.

Ground breakage or severe
cracking and differential su
ence affected the entire Gu
Alaska coast as far eas
Yakutat Bay during the 1964
quake. Most ground fissures
in thick, coarse-grained, co
dated sediments. Well dr
surficial deposits general
not develop extensive fiss
Bedrock is less susceptib
ground breakage. In offshor
gions, areas of thick sedim
deposits, and slopes of 0.5
or more have a high potentia
ground failure.

Faulting: The graphic show
major late Cenozoic faults.
ments along faults are a fu
of the occurrence of earthqu
Thatcher and Plafker (1977)
described the 1899 Yakuta
earthquake, during which t
tilting of the regional
surface occurred over an ar
1500 km^2. Seven meters of
zontal (right-lateral slip)
ment occurred on the Fairwe
Fault because of the 1958
Bay earthquake (see gra

Figure II. A. 1.

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Molnia and others (1976) have mapped numerous shallow sub-bottom faults in the Gulf of Alaska; however, few faults have clearly offset Holocene sediments.

The shallow faults that cut through Holocene sediments to the surface of the seabed offer a potential natural hazard comparable to the shallow fault along which the Santa Barbara blowout occurred. A number of near-surface faults have been shown on the graphic on the basis of recent field work by Molnia and Carlson of the USGS. Unless a fault actually cuts the seabed and has been determined to be active, i.e., still capable of movement, then most such inactive near-surface, shallow faults are not considered to be extremely hazardous and may be readily mitigated either by well design, drilling procedures, or well location. Despite the scarcity of surface-cut shallow faults, the relatively high frequency of earthquakes in the Gulf of Alaska suggests that potential future differential movements of the seafloor are still quite probable. Thus, the risk of a surface-shallow fault occurring on the OCS must still be considered.

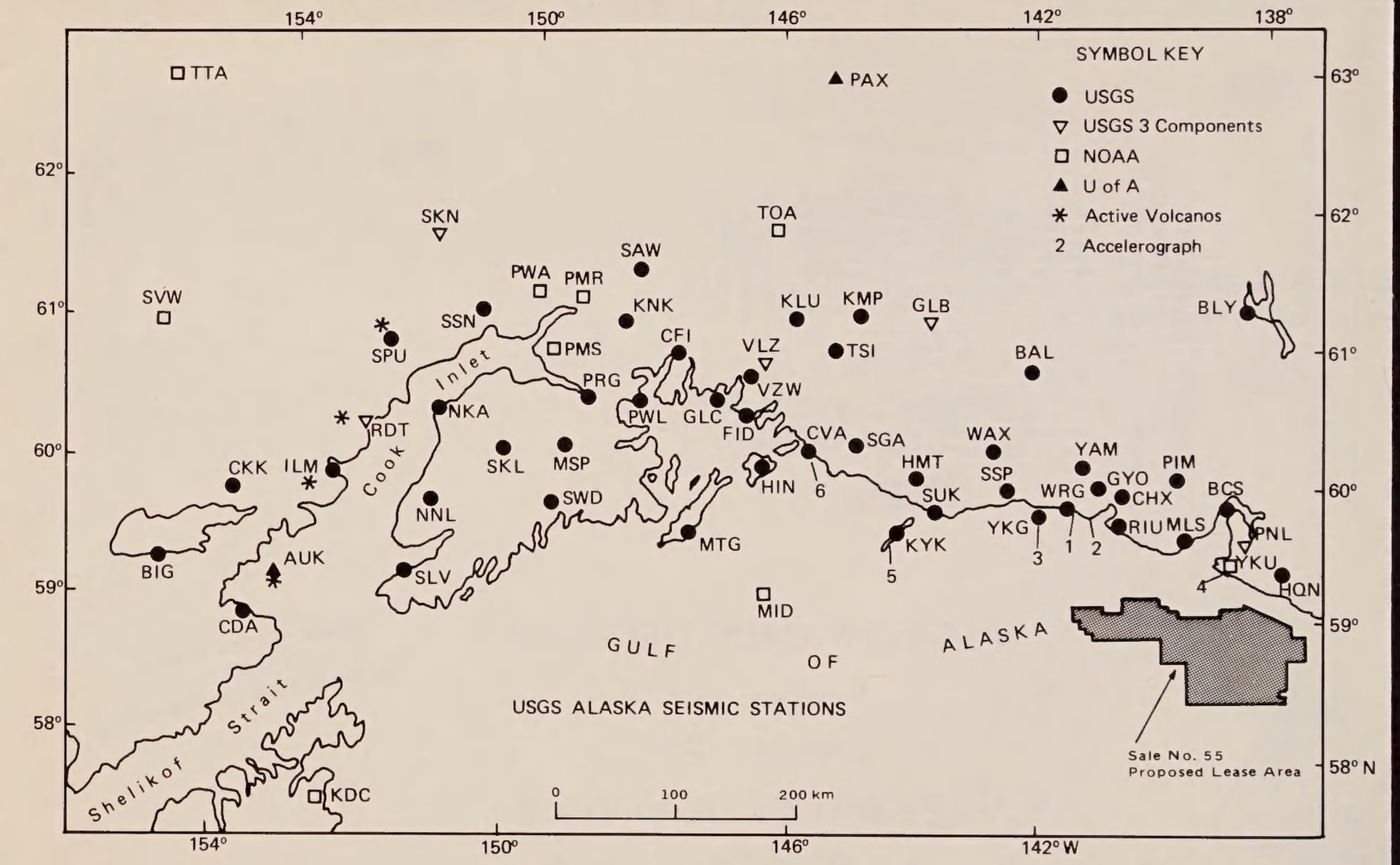
Gas-Charged Sediments: High-pressured, gas-charged sediments exist in the proposed lease area (see graphic).

Shallow, gas-charged sediments suggest that appropriate drilling procedures be adopted in drilling into sediments containing either thermogenic or biogenic gases.

Other Potential Hazards: Some bedforms, which are like sand dunes, are located about 5 km from shore south of the Situk River. These bedforms which can be as high as 10 m and 1,000 m long, may pose some geotechnical problems to offshore pipeline routes (see graphic).

In addition, Molnia (1976 and 1977) has suggested that some geotechnical hazards may be present in Icy Bay due to high rates of sedimentation, and that submarine glacial moraines and buried ice offshore may be present offshore of the mouth of Yakutat and Icy Bay, Lituya Bay, Malaspina Glacier, and Cross Sound.

Post and Maya (1971) have described the potential for onshore glacial lake breakouts.

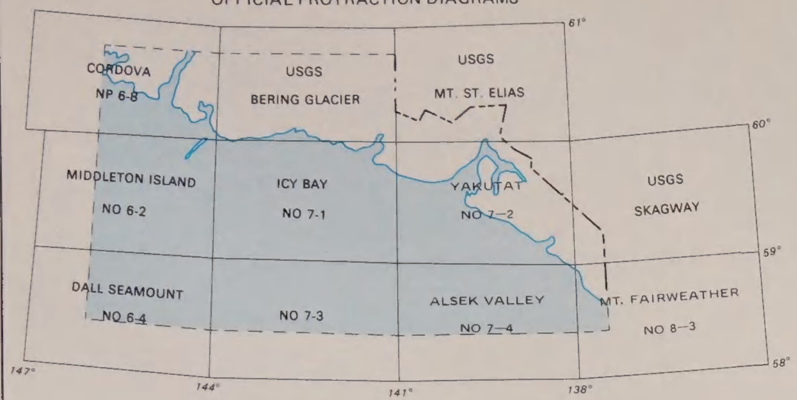


Source: Lahr and Plafker, 1979

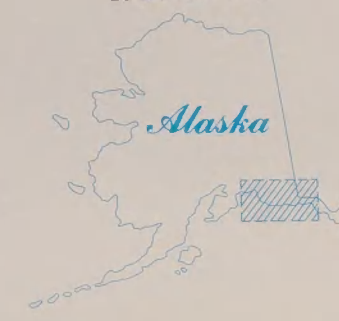
Seismic network in southern Alaska, as well as the closest accelerograph stations to the earthquake of February 28, 1979.

#6139005 ID: 88076077 TD195.P4 A434 1980 v.2

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

Bureau of Land Management
Library
Denver Service Center

GRAPHIC NO. 2

METEOROLOGICAL CONDITIONS
AND
PHYSICAL OCEANOGRAPHY

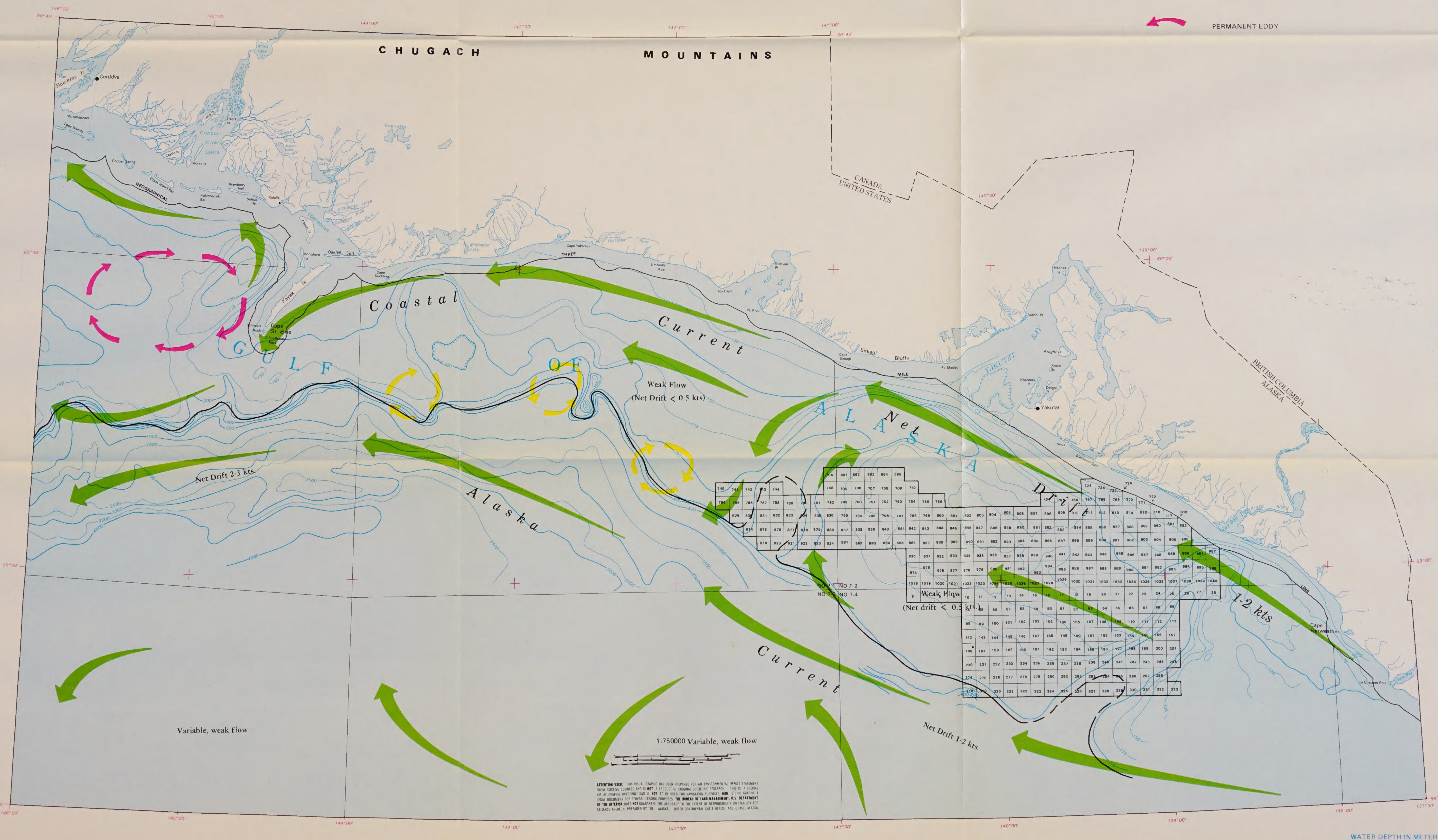
——— SHELF BREAK

– – – INFERRED SHELF BREAK

NET DRIFT

TRANSIENT EDDY

PERMANENT EDDY



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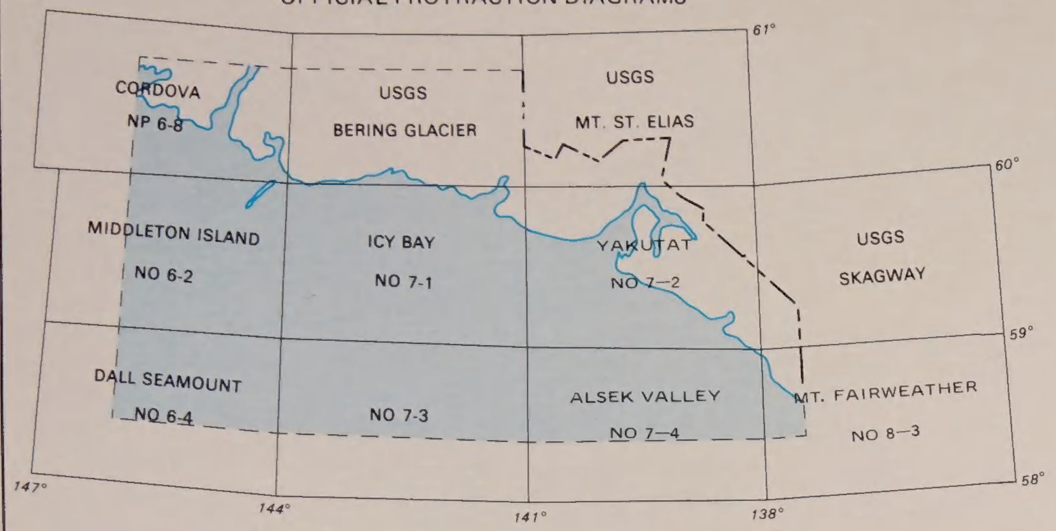
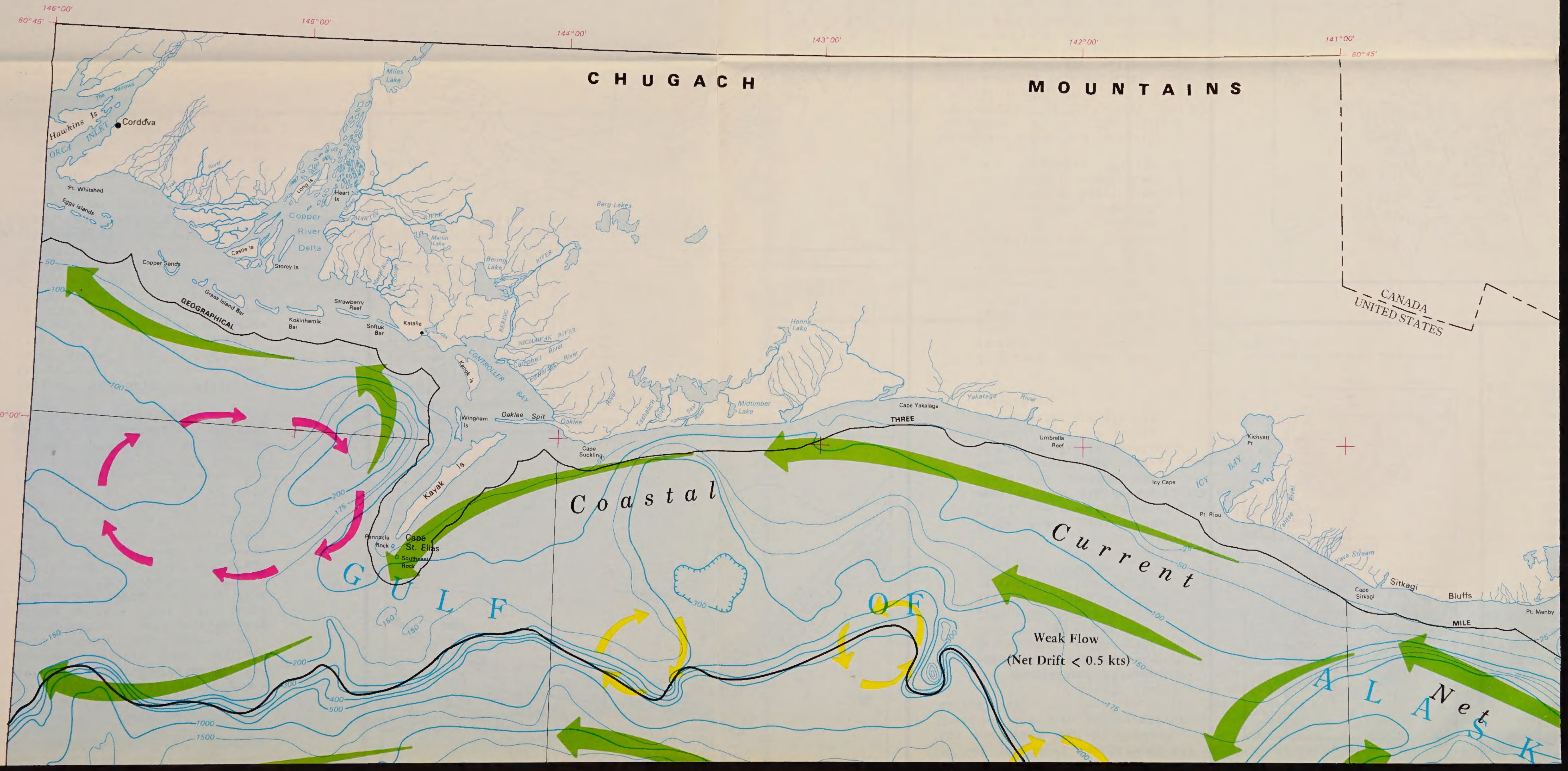
COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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DEPARTMENT OF THE INTERIOR

EASTERN GULF OF ALASKA

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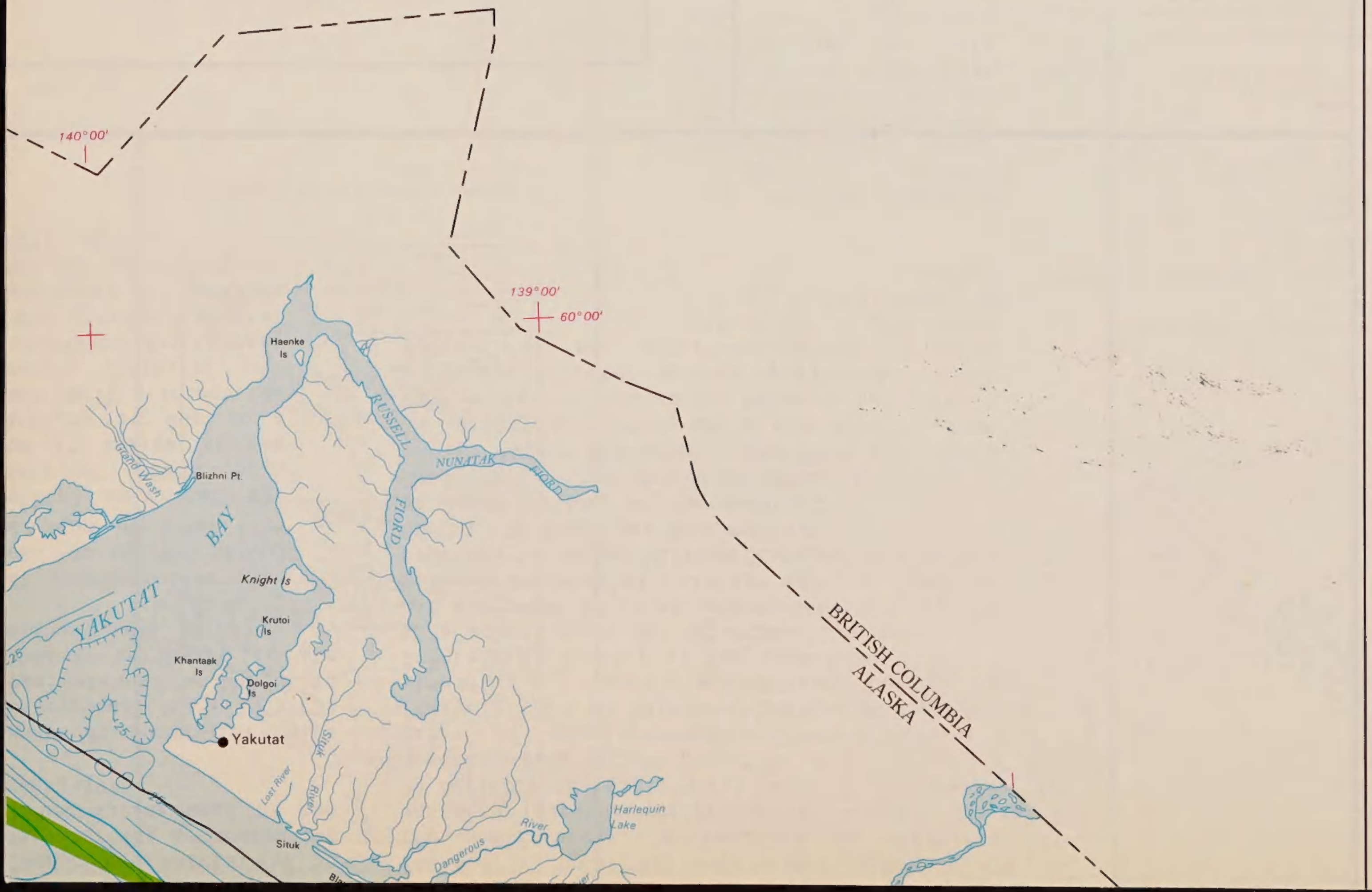
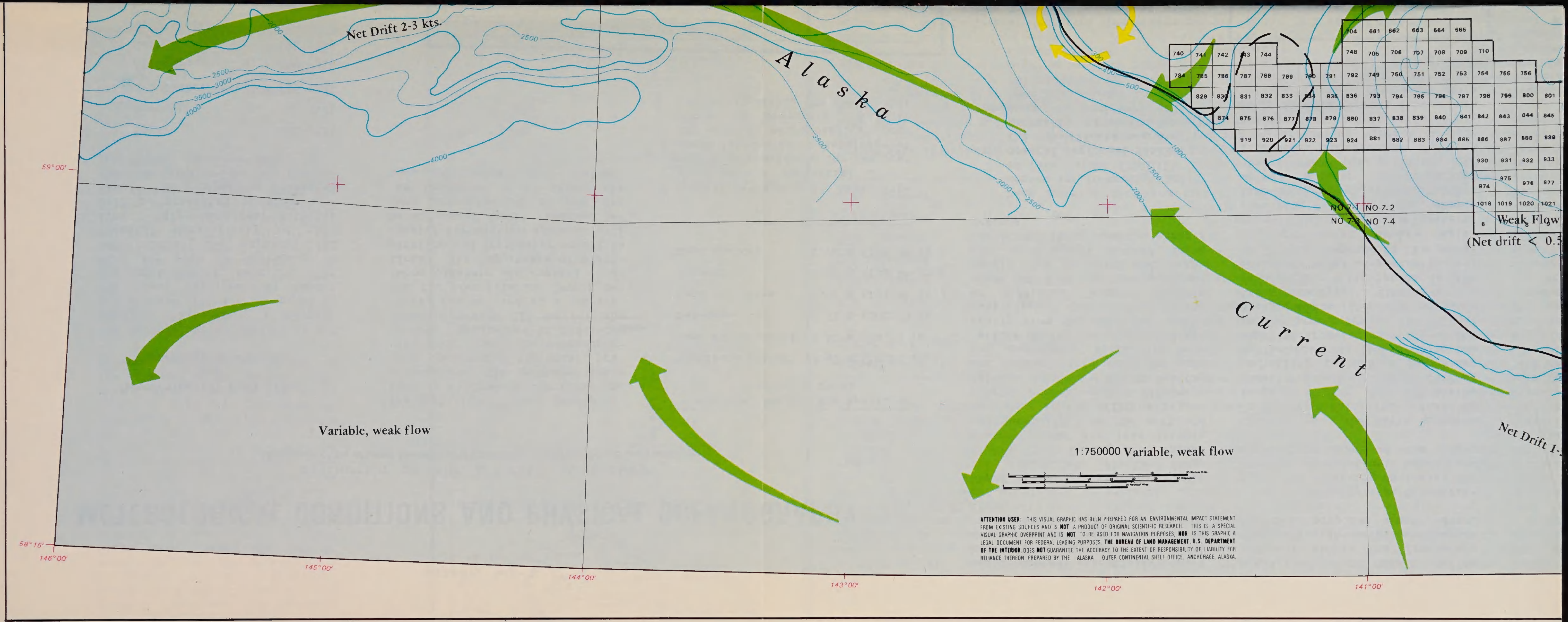
——	SHELF BREAK
– – – –	INFERRED SHELF BREAK
🟩 ←	NET DRIFT
🟨 ←	TRANSIENT EDDY
🟥 ←	PERMANENT EDDY





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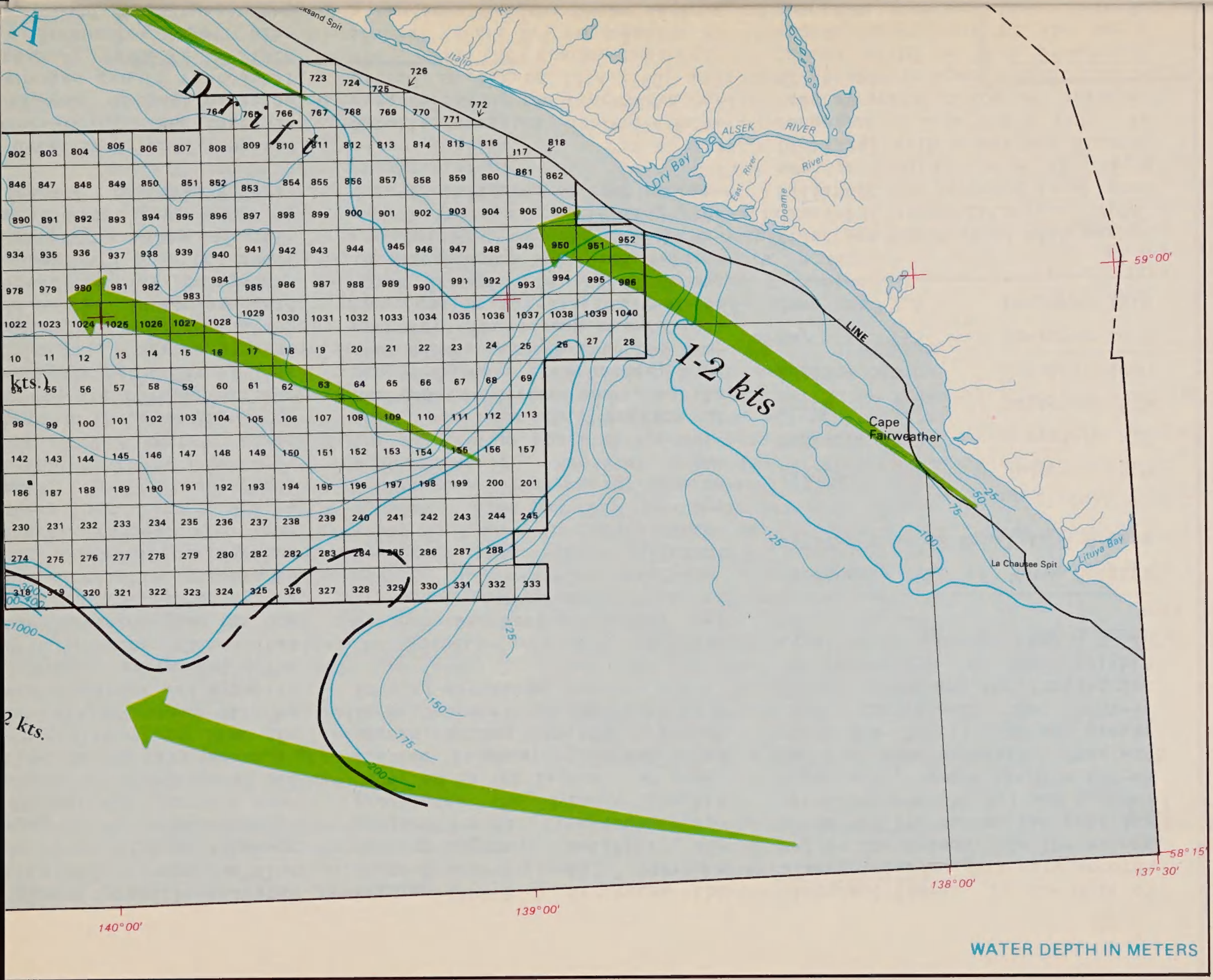
A
Drift
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ALSEK RIVER
East River
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LINE
Cape Fairweather
La Chaussee Spit
Lituya Bay
25
50
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125
150
175
200
1000
59° 00'
58° 15'
137° 30'
138° 00'
139° 00'
140° 00'
WATER DEPTH IN METERS

GRAPHIC NO. 2

METEROLOGICAL CONDITIONS AND PHYSICAL OCEANOGRAPHY

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Affected Environmental Conditions on Offshore Oil and Gas Operations

II.A.2.
Meteorological Conditions and Physical Oceanography

The meteorological conditions and physical oceanography in the proposed lease area are discussed in the final environmental impact statement (FEIS), sale 39. The FEIS for sale 39 discusses in more detail the physical and chemical oceanography of this area. Only additional material will be presented in this section. The information presented here was provided by the following OCSEAP Research Units (RU):

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Storms: The Gulf of Alaska is the terminal of the longest over-water storm track in the world (fig. II.A.2.-1). The Aleutian Low, which is the major influence in the Gulf of Alaska from October to March, is continuously reinforced by successive lows moving into the area from the Pacific Ocean. Frequent storms, with highly variable, gusty winds, move rapidly through the region. No obstruction to storm paths exists until the coastal mountains are encountered. A compaction of pressure gradients along the mountain slopes results causing winds that are stronger than indicated by barometric pressure gradients.

Periods of high winds can persist *for several days. In the Gulf of* Alaska, recorded wind speeds accompanying severe storms, have reached 100 knots or more. Nearshore winds, during the winter months of November through February, can be expected to reach 34 knots or more about 10 percent of the time.

Generally, intense gulf lows tend to create strong east to northeast winds. Occasionally, during the summer, synoptic pressure gradients directed inland, can cause strong winds.

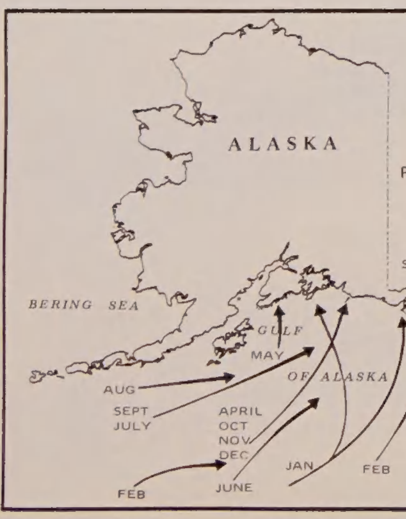


FIGURE II.A.2.-1.
Gulf of Alaska
Primary Storm Tracks

Source: Brower, 1977.

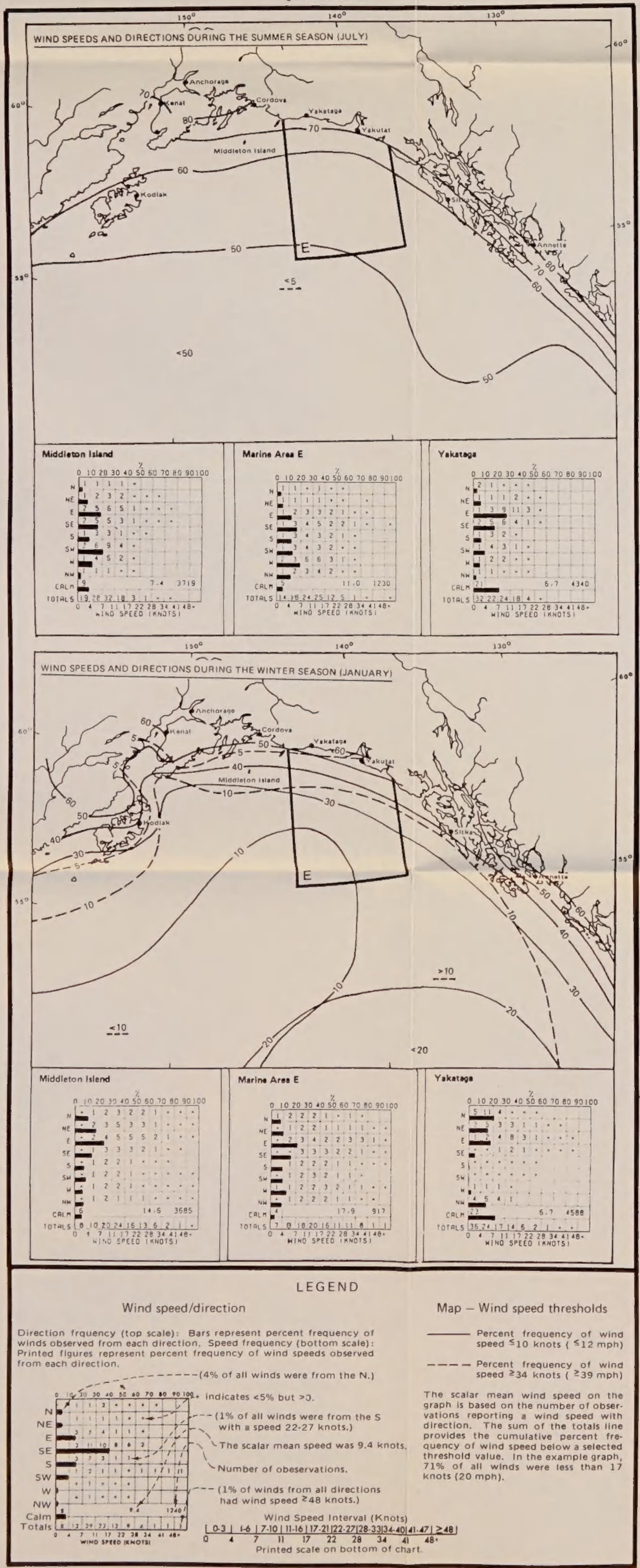
Precipitation: Heavy precipitation is evident on the coastline adjacent to the proposed lease area. Seaward of the coast, precipitation levels decrease appreciably. The record at Middleton Island, located 125 km off the coast, can be used as a comparison for precipitation levels between offshore and coastal locations. The importance of precipitation and freshwater runoff to coastal circulation dynamics will be discussed later. Average annual precipitation records for the locations in or nearby the proposed lease area follow:

Average Annual Precipitation (including snow)

Middleton Island	1.47 m (58.02 in.)
Cape Hinchinbrook	2.40 m (94.33 in.)
Yakataga	2.61 m (102.75 in.)
Cape St. Elias	2.59 m (101.98 in.)
Yakutat	3.36 m (132.46 in.)
Cape Spencer	2.72 m (106.94 in.)

Coastal Climatology: When offshore/onshore industrial development is considered for the proposed lease area, a knowledge of the coastal meteorological processes is imperative. A spill trajectory within the shelf break would depend essentially on a knowledge of synoptic and local coastal surface winds, prevailing wave parameters, and mean current transport.

Figure II.A.2.-2.


WIND SPEEDS AND DIRECTIONS DURING THE SUMMER SEASON (JULY)
150°
140°
130°
60°
55°
Anchorage
Kenai
Cordova
Yakataga
Yakutat
Middleton Island
Kodiak
70
80
60
50
E
Middleton Island
Marine Area E
Yakataga
WIND SPEED (KNOTS)
TOTALS
CALM
WIND SPEEDS AND DIRECTIONS DURING THE WINTER SEASON (JANUARY)
Middleton Island
Marine Area E
Yakataga
LEGEND
Wind speed/direction
Map – Wind speed thresholds
N
NE
E
SE
S
SW
W
NW
Calm
Totals
WIND SPEED (KNOTS)
(4% of all winds were from the N.)
• indicates <5% but >0.
(1% of all winds were from the S with a speed 22-27 knots.)
The scalar mean speed was 9.4 knots.
Number of obeservations.
(1% of winds from all directions had wind speed ≥48 knots.)
Wind Speed Interval (Knots)
0-3 | 1-6 | 7-10 | 11-16 | 17-21 | 22-27 | 28-33 | 34-40 | 41-47 | ≥48
0 4 7 11 17 22 28 34 41 48+
Printed scale on bottom of chart.
Percent frequency of wind speed ≤10 knots (≤12 mph)
Percent frequency of wind speed ≥34 knots (≥39 mph)

Direction frquency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

Source: Brower, W.A., Jr., H.W. Searby, J.L. Wise. Climatic Atlas, Outer Continental Shelf Waters and Coastal Regions of Alaska; Vol. 1. Gulf of Alaska Arctic Environmental Information and Data Center (AEIDC). University of Alaska, Anchorage and U.S. National Climatic Center, Ashville, North Carolina, 1977.

Winds are highly variable within the Gulf of Alaska (fig. II.A.2.-2). During the summer season, winds are less intense and generally from the west and southwest in the offshore region (Marine Area E) and at Middleton Island. Onshore winds at Yakataga are predominantly from the east and southeast. Winds are more intense during the winter and generally from the east and southeast offshore (Marine Area E) and at Middleton Island. Onshore winds at Yakataga are predominantly from the north and northeast as a result of cold, dense air accumulation from the onshore regions.

> Many near surface processes act to modify the surface winds in the coastal region of Alaska. The modifications are generally extensive enough to seriously effect any attempt to relating synoptic weather maps to surface conditions (Reynolds, 1977).

Several processes interact to produce and modify coastal winds. At any one time, one or more of the processes may be dominant. Three of the main processes are as follows:

> The mountainous terrain interacting with the superimposed geostrophic flow to produce a complex wind flow which is evident on land and which extends a significant distance offshore.
>
> Slope Winds (katabatic flow), the down hill movement of cold air during clear sky periods can cause significant winds along the Alaska coast, especially at the mouths of estuaries and glacial valleys.
>
> A strong land-use difference in air temperatures in the boundary layer produces a force capable of modifying surface winds from predictions based only on pressure and friction. This baroclinic shear (thermal winds) act to enhance the westerly component of the mixed layer wind in a rather complicated way (Reynolds, 1977).

Nearshore areas are subject to "katabatic" winds. These winds are comprised of cold, dry, continental winds, which spill suddenly and with high velocity downslope through glacial valleys and out to sea over the warmer, oceanic water. Wind velocities up to 100 knots can be encountered during these unexpected, brief phenomena. Katabatic winds often blow counter to the prevailing wave directions and produce steep, rough seas. Their influence dissipates rapidly and seldom extends over 20-25 miles seaward. Katabatic winds usually occur during the winter and at night during the summer.

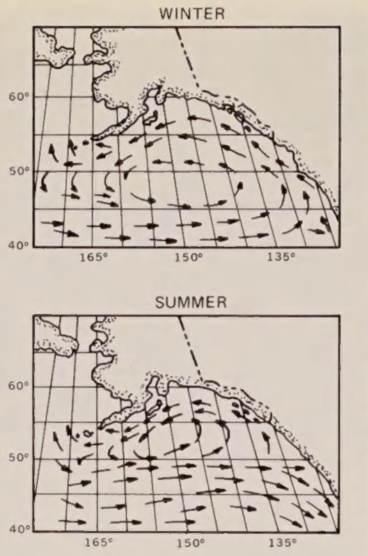
The meteorological conditions favorable to the development of "katabatic" winds usually last from 3 to 4 days. These highly localized winds funnel through topographical depressions along the coast under moderate coastal southeast winds. Although the coastal wind patterns are very complex, with many local characteristics, the synoptic coastal winds show a distinct bimodality in an east-west direction paralleling the coastline.

Interaction between the regional weather conditions and the local coastal weather processes can result in weather patterns that vary from location to location. Only in the latter years have systematic field efforts begun to yield quantitative data to unravel and separate the essential driving mechanisms of the coastal weather. A contaminant spill trajectory would need recent data to define movement within the frequently changing, high-energy environment of the proposed lease area.

b. Physical Oceanography: The following discusses the current circulation, waves and tides, and winds of the area.

Circulation. The Earth Resource Technology Satellite (LANDSAT) imagery of the Gulf of Alaska shows a counterclockwise current prevailing throughout the year. In the fall, as the Aleutian Low migrates from its summer position in the Bering Sea to the Gulf of Alaska, winds intensify and alter the Alaska Gyral's dimension (fig. II.A.2.-3). Circulation in the nearshore areas is generally westward. Superimposed on the general westward coastal flow are complicated local circulation patterns resulting from the tides, shoreline topography, offshore bathymetry, localized and prevailing winds, heavy precipitation, and freshwater runoff. In the winter, prevailing winds blow from the southeast resulting in an onshore surface current flow. Downwelling follows and acts as a flushing mechanism for shelf waters through annual cycling (Royer, 1976).

Figure II. A. 2.—3.



Permanent currents in the Gulf of Alaska (Plathotnik, 1964)

During summer, prevailing southwest winds affect surface flow resulting in an offshore flow and a weakening of the westward current. Bathymetric contours control the general direction of offshore flow during all seasons. Inshore circulation is less affected by bathymetry and more by the prevailing local and synoptic coastal dynamic processes. The shelf break separates the coastal circulation patterns from the oceanic regime. Royer (1978) states, "The shelf circulation appears to consist of a coastal current and a shelf break current with weak flow between them (fig. II.A.2.-4)." The coastal current and shelf break current sustains a westerly net drift of 1-2 knots. Shelf waters between these dominant current systems are highly variable with a westerly net drift of less than 0.5 knots. A series of transient eddies are generated along the shelf break. In the proposed lease area, several embayments leading shoreward from the shelf break bring excursions of offshelf ocean water into areas of lower density coastal waters.

Recent data from the proposed lease area indicate the increasing importance of precipitation and freshwater runoff to coastal circulation. Evidence exists that the freshwater runoff provides a boundary between the coastal and ocean waters and is the primary forcing mechanism for coastal flow during most of the year (Royer, 1978).

The sources of freshwater which drive the regional coastal circulation can extend from the State of Washington northward to the proposed lease area.

> The precipitation affects the current through the input of fresh (low density) water at the coastline. This high rate of inflow at the coastline is due to a cross shelf gradient (decreasing offshore). It is enhanced during most of the year by a coastal convergence of surface water due to wind stress (Royer, 1978).

Figure II.A.2.-5 indicates the control of coastal currents through dynamic heights. Increased coastal flow closely approximates the dynamic heights depicted in the figure. At times of low freshwater inflow, wind stress, acting upon the sea surface, becomes more important as a forcing mechanism.

The Yakutat area has been described as having smaller net transport with possible areas of eddies and current reversals. Resident times for a pollutant would be higher in such an environment. From Icy Bay to Cape Suckling, a higher energy environment prevails. Resident times for a pollutant would be appreciably lower for this section of the coast. Farther west, on the proposed lease area border, current flow separates into two components: One stream enters into the complex circulation west of Kayak Island, the other follows the shelf break south off Middleton Island. Ongoing OCSEAP Research Units are performing studies in this area of complex circulation.

Satellite-tracked drifter buoys were released; the tracks are depicted in figure II.A.2.-6, and -7. From the tracks depicted, several trends are noticeable: 1) *a tendency for the buoys to move* inshore, 2) once the buoys cross the shelf break, a pronounced westward longshore drift occurs, 3) offshore the shelf break, some eastward flow occurs possibly in areas of quasi-permanent flow (Royer, 1978), 4) offshore, several eddies and meanders are evident. Eventually, several of the buoys were enmeshed in the anti-cyclonic eddy west of Kayak Island and transported farther into the approaches to Prince William Sound. One of the buoys was beached east of Kayak Island in the proposed lease area. Care should be taken not to equate the buoy tracks as the actual trajectory of a surface pollutant, but as the transportation effected by the upper portion of the water column.

Waves and Tides. In the Gulf of Alaska, wave heights vary according to the season. In the autumn, north Pacific storms can generate waves to 9 m (30 ft) and higher. Reportedly, waves 12-20 m (40-65 ft) high have occurred. Seas with waves 3 m (10 ft) high are prevalent throughout the winter. Listed below are the frequencies in percentage for wave heights equal to or greater than 6 m (20 ft).

Frequency (%) of Wave Heights Greater than or Equal to 6 Meters

January	9.0	July	4.0
February	10.0	August	4.5
March	9.5	September	6.5
April	10.0	October	10.0
May	9.5	November	10.5
June	7.5	December	15.0

Tides are semidiurnal with marked diurnal inequalities. Tidal ranges in the proposed lease area have a diurnal range of 2-4 m (7-13 ft) with a maximum diurnal range of 4.4 m (14.4 ft). In coastal areas of low net transport, tidal effects upon current circulation would be more pronounced and locally could be the major *transport factor (i.e., Yakutat* Bay).

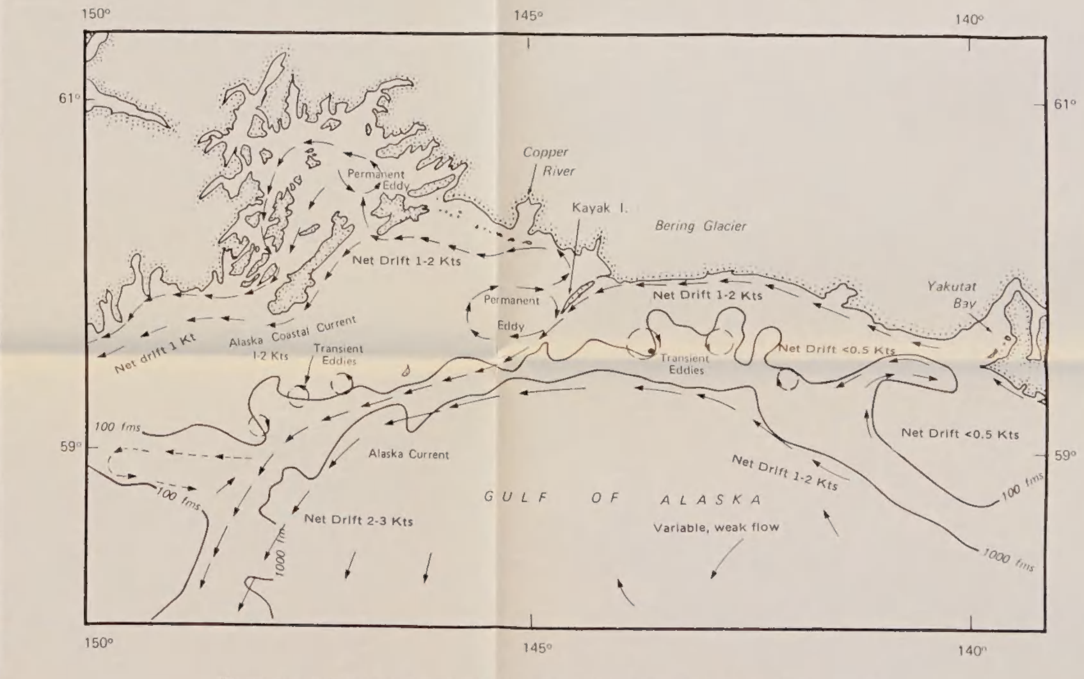
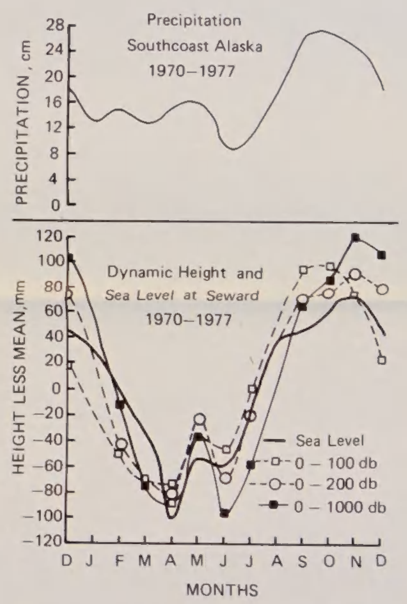


Figure II.A.2.-4. Net Drift of Surface Currents in the Northern Gulf of Alaska (Royer, 1979)

Figure II A. 2.— 5.



Sea level, dynamic height, and precipitation cycles for south coast of Alaska (Royer, 1978)

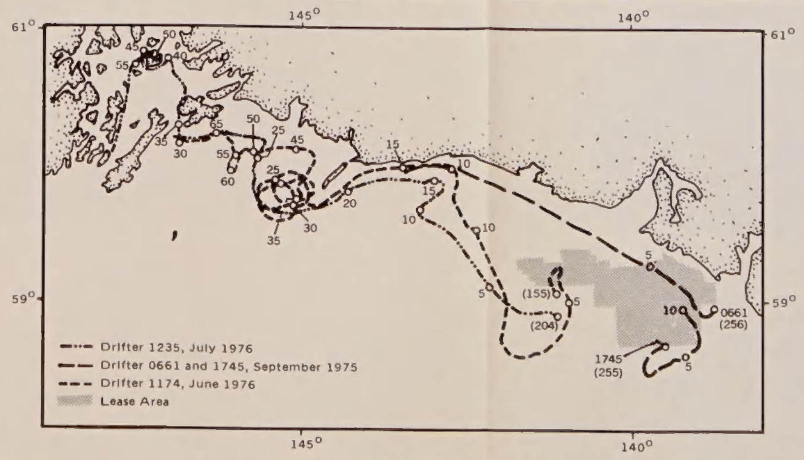


Figure II.A.2.-6. Satellite Tracked Drifting (cumulative number of days) Bouy Trajectories (Royer et. al., 1979)

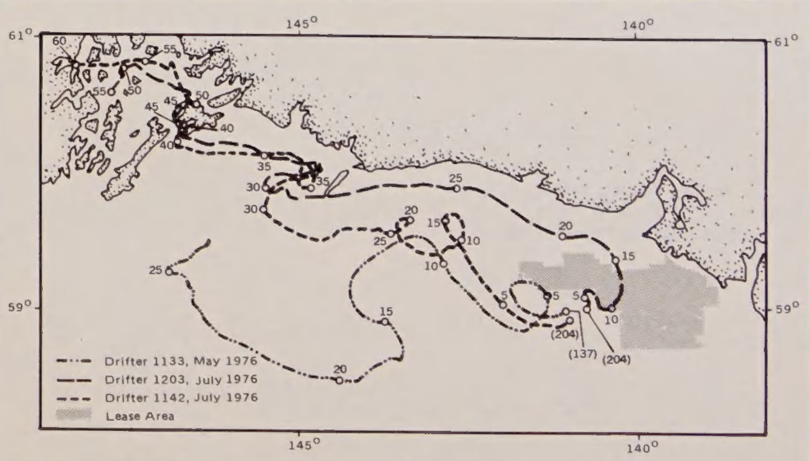


Figure II.A.2.-7. Satellite Tracked Drifting (cumulative number of days) Bouy Trajectories (Royer et. al., 1979)

GRAPHIC NO. 2

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Reynolds	(RU 367)

a. Meteorological Conditions: The Gulf of Alaska and the adjacent coastline is dominated by a maritime climate. The weather in this zone exhibits mild winters, cool summers, heavy precipitation, and persistently strong surface winds. The three dominating weather systems that influence the regional climate are the Aleutian Low, which migrates into the north Pacific in the winter; the Pacific High, which is displaced south in the winter and northward in the summer; and the Continental High over the adjoining land mass during the winter. In the Gulf of Alaska, frequent and extreme changes in barometric pressure patterns are prevalent.

Storms: The Gulf of Alaska is the terminal of the longest overwater storm track in the world (fig. II.A.2.-1). The Aleutian Low, which is the major influence in the Gulf of Alaska from October to March, is continuously reinforced by successive lows moving into the area from the Pacific Ocean. Frequent storms, with highly variable, gusty winds, move rapidly through the region. No obstruction to storm paths exists until the coastal mountains are encountered. A compaction of pressure gradients along the mountain slopes results causing winds that are stronger than indicated by barometric pressure gradients.

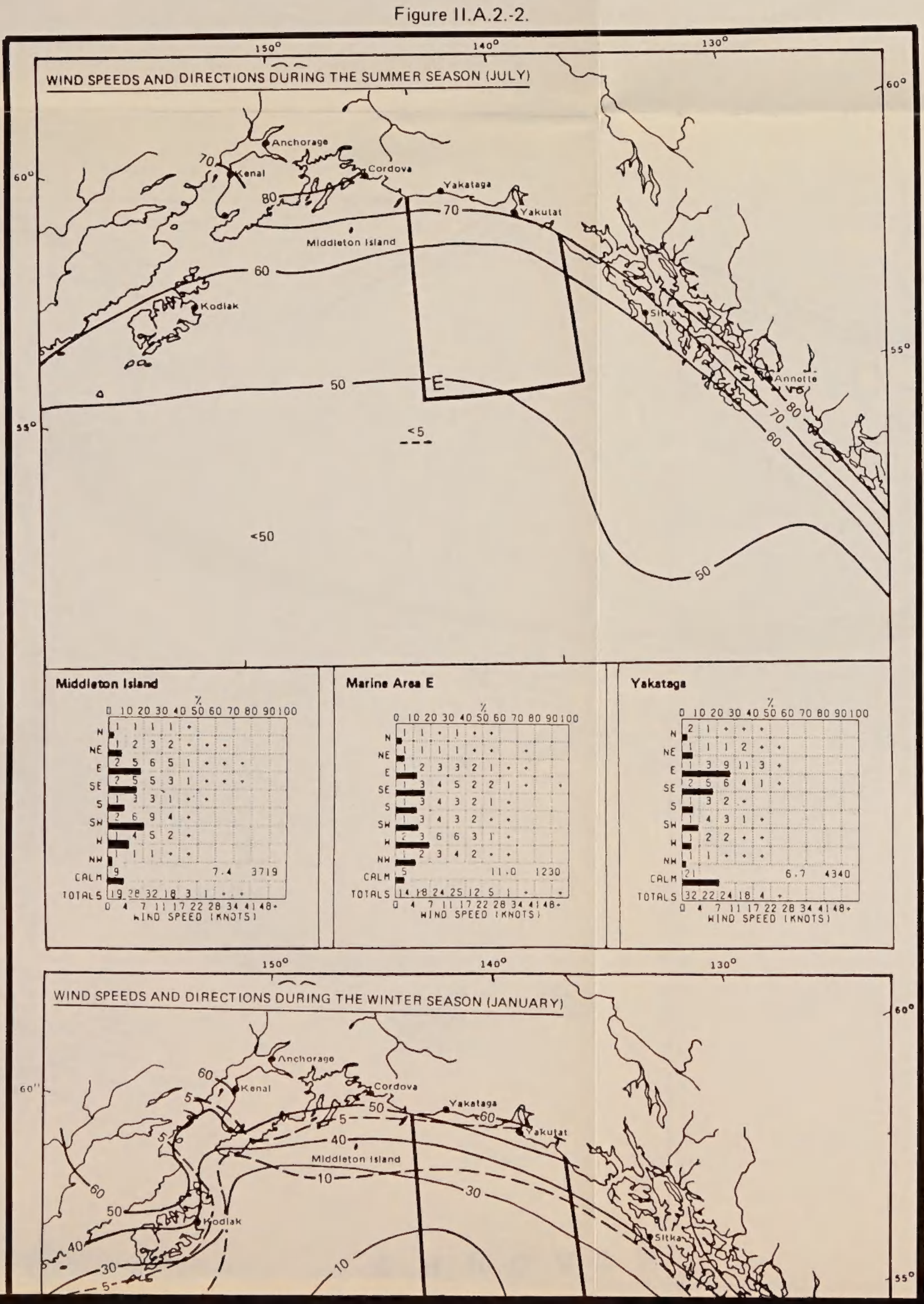
Periods of high winds can persist

Precipitation: Heavy precipitation is evident on the coastline adjacent to the proposed lease area. Seaward of the coast, precipitation levels decrease appreciably. The record at Middleton Island, located 125 km off the coast, can be used as a comparison for precipitation levels between offshore and coastal locations. The importance of precipitation and freshwater runoff to coastal circulation dynamics will be discussed later. Average annual precipitation records for the locations in or nearby the proposed lease area follow:

Average Annual Precipitation (including snow)	
Middleton Island	1.47 m (58.02 in.)
Cape Hinchinbrook	2.40 m (94.33 in.)
Yakataga	2.61 m (102.75 in.)
Cape St. Elias	2.59 m (101.98 in.)
Yakutat	3.36 m (132.46 in.)
Cape Spencer	2.72 m (106.94 in.)

Coastal Climatology: When offshore/onshore industrial development is considered for the proposed lease area, a knowledge of the coastal meteorological processes is imperative. A spill trajectory within the shelf break would depend essentially on a knowledge of synoptic and local coastal surface winds, prevailing wave parameters, and mean current transport.

Figure II.A.2.-2.



Winds are highly variable within the Gulf of Alaska (fig. II.A.2.-2). During the summer season, winds are less intense and generally from the west and southwest in the offshore region (Marine Area E) and at Middleton Island. Onshore winds at Yakataga are predominantly from the east and southeast. Winds are more intense during the winter and generally from the east and southeast offshore (Marine Area E) and at Middleton Island. Onshore winds at Yakataga are predominantly from the north and northeast as a result of cold, dense air accumulation from the onshore regions.

> Many near surface processes act to modify the surface winds in the coastal region of Alaska. The modifications are generally extensive enough to seriously effect any attempt to relating synoptic weather maps to surface conditions (Reynolds, 1977).

Several processes interact to produce and modify coastal winds. At any one time, one or more of the processes may be dominant. Three of the main processes are as follows:

> The mountainous terrain interacting with the superimposed geostrophic flow to produce a complex wind flow which is evident on land and which extends a significant distance offshore.
>
> Slope Winds (katabatic flow), the down hill movement of cold air during clear sky periods can cause significant winds along the Alaska coast, especially at the mouths of estuaries and glacial valleys.
>
> A strong land-use difference in air temperatures in the boundary layer produces a force capable of modifying surface winds from predictions based only on pressure and friction. This baroclinic shear (thermal winds) act to enhance the westerly component of the mixed layer wind in a rather complicated way (Reynolds, 1977).

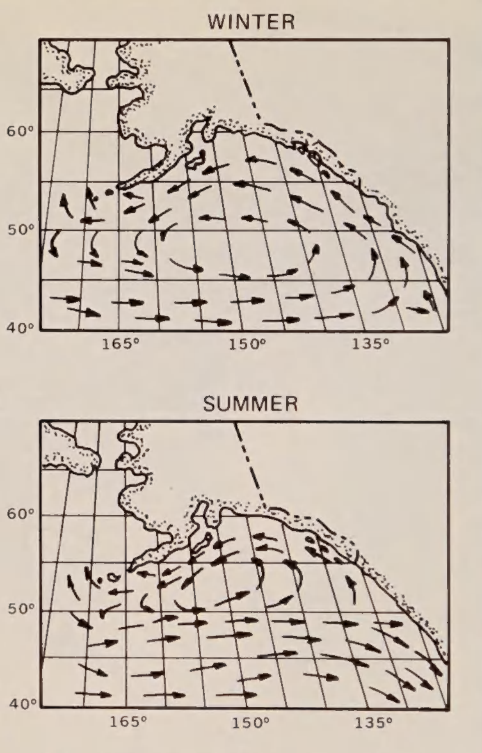
Nearshore areas are subject to "katabatic" winds. These winds are comprised of cold, dry, continental winds, which spill suddenly and with high velocity downslope through glacial valleys and

would need recent data to define movement within the frequently changing, high-energy environment of the proposed lease area.

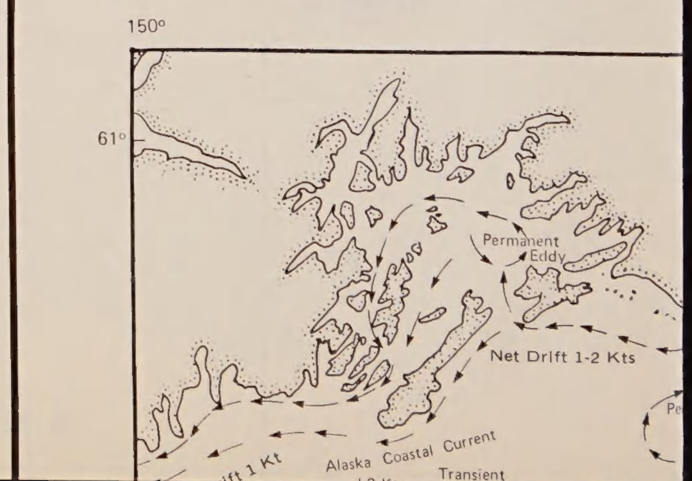
b. Physical Oceanography: The following discusses the current circulation, waves and tides, and winds of the area.

Circulation. The Earth Resource Technology Satellite (LANDSAT) imagery of the Gulf of Alaska shows a counterclockwise current prevailing throughout the year. In the fall, as the Aleutian Low migrates from its summer position in the Bering Sea to the Gulf of Alaska, winds intensify and alter the Alaska Gyral's dimension (fig. II.A.2.-3). Circulation in the nearshore areas is generally westward. Superimposed on the general westward coastal flow are complicated local circulation patterns resulting from the tides, shoreline topography, offshore bathymetry, localized and prevailing winds, heavy precipitation, and freshwater runoff. In the winter, prevailing winds blow from the southeast resulting in an onshore surface current flow. Downwelling follows and acts as a flushing mechanism for shelf waters through annual cycling (Royer, 1976).

Figure II. A. 2.– 3.



Permanent currents in the Gulf of Alaska (Plathotnik, 1964)



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summer, prevailing south-inds affect surface flow ng in an offshore flow and ning of the westward cur-Bathymetric contours con-e general direction of off-flow during all seasons. circulation is less af-by bathymetry and more by vailing local and synoptic dynamic processes. The reak separates the coastal tion patterns from the oce-gime. Royer (1978) states, elf circulation appears to of a coastal current and break current with weak tween them (fig. II.A.2.-4)." astal current and shelf urrent sustains a westerly ift of 1-2 knots. Shelf between these dominant cur-stems are highly variable westerly net drift of less 5 knots. A series of tran-ddies are generated along lf break. In the proposed area, several embayments shoreward from the shelf pring excursions of off-ocean water into areas of density coastal waters.

data from the proposed rea indicate the increas-portance of precipitation shwater runoff to coastal tion. Evidence exists ne freshwater runoff pro-a boundary between the and ocean waters and is mary forcing mechanism for flow during most of the oyer, 1978).

rces of freshwater which he regional coastal circu-can extend from the State hington northward to the d lease area.

e precipitation af-cts the current through e input of fresh (low nsity) water at the astline. This high te of inflow at the astline is due to a oss shelf gradient (de-easing offshore). It enhanced during most the year by a coastal nvergence of surface ter due to wind stress oyer, 1978).

Figure II.A.2.-5 indicates the control of coastal currents through dynamic heights. Increased coastal flow closely approximates the dynamic heights depicted in the figure. At times of low freshwater inflow, wind stress, acting upon the sea surface, becomes more important as a forcing mechanism.

The Yakutat area has been described as having smaller net transport with possible areas of eddies and current reversals. Resident times for a pollutant would be higher in such an environment. From Icy Bay to Cape Suckling, a higher energy environment prevails. Resident times for a pollutant would be appreciably lower for this section of the coast. Farther west, on the proposed lease area border, current flow separates into two components: One stream enters into the complex circulation west of Kayak Island, the other follows the shelf break south off Middleton Island. Ongoing OCSEAP Research Units are performing studies in this area of complex circulation.

Satellite-tracked drifter buoys were released; the tracks are depicted in figure II.A.2.-6, and -7. From the tracks depicted, several trends are noticeable: 1) a tendency for the buoys to move inshore, 2) once the buoys cross the shelf break, a pronounced westward longshore drift occurs, 3) offshore the shelf break, some eastward flow occurs possibly in areas of quasi-permanent flow (Royer, 1978), 4) offshore, several eddies and meanders are evident. Eventually, several of the buoys were enmeshed in the anti-cyclonic eddy west of Kayak Island and transported farther into the approaches to Prince William Sound. One of the buoys was beached east of Kayak Island in the proposed lease area. Care should be taken not to equate the buoy tracks as the actual trajectory of a surface pollutant, but as the transportation effected by the upper portion of the water column.

Waves and Tides. In the Gulf of Alaska, wave heights vary according to the season. In the autumn, north Pacific storms can generate waves to 9 m (30 ft) and higher. Reportedly, waves 12-20 m (40-65 ft) high have occurred. Seas with waves 3 m (10 ft) high are prevalent throughout the winter. Listed below are the frequencies in percentage for wave heights equal to or greater than 6 m (20 ft).

Frequency (%) of Wave Heights Greater than or Equal to 6 Meters

January	9.0	July	4.0
February	10.0	August	4.5
March	9.5	September	6.5
April	10.0	October	10.0
May	9.5	November	10.5
June	7.5	December	15.0

Tides are semidiurnal with marked diurnal inequalities. Tidal ranges in the proposed lease area have a diurnal range of 2-4 m (7-13 ft) with a maximum diurnal range of 4.4 m (14.4 ft). In coastal areas of low net transport, tidal effects upon current circulation would be more pronounced and locally could be the major transport factor (i.e., Yakutat Bay).

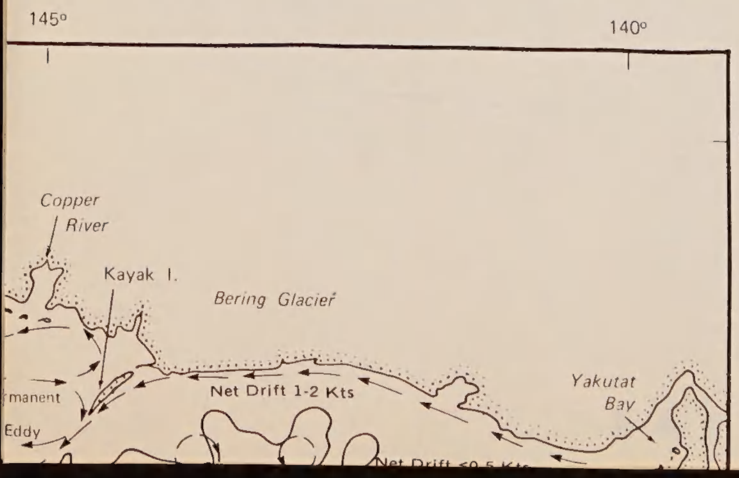
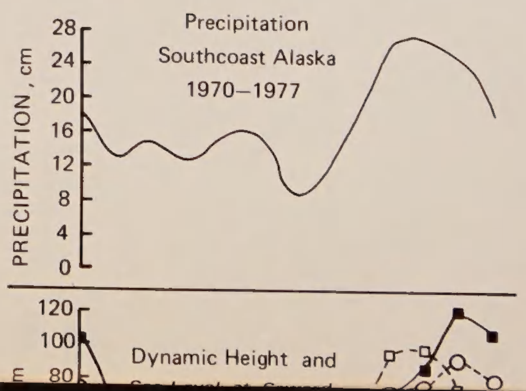


Figure II A. 2.– 5.



for several days. In the Gulf of Alaska, recorded wind speeds accompanying severe storms, have reached 100 knots or more. Nearshore winds, during the winter months of November through February, can be expected to reach 34 knots or more about 10 percent of the time.

Generally, intense gulf lows tend to create strong east to northeast winds. Occasionally, during the summer, synoptic pressure gradients directed inland, can cause strong winds.

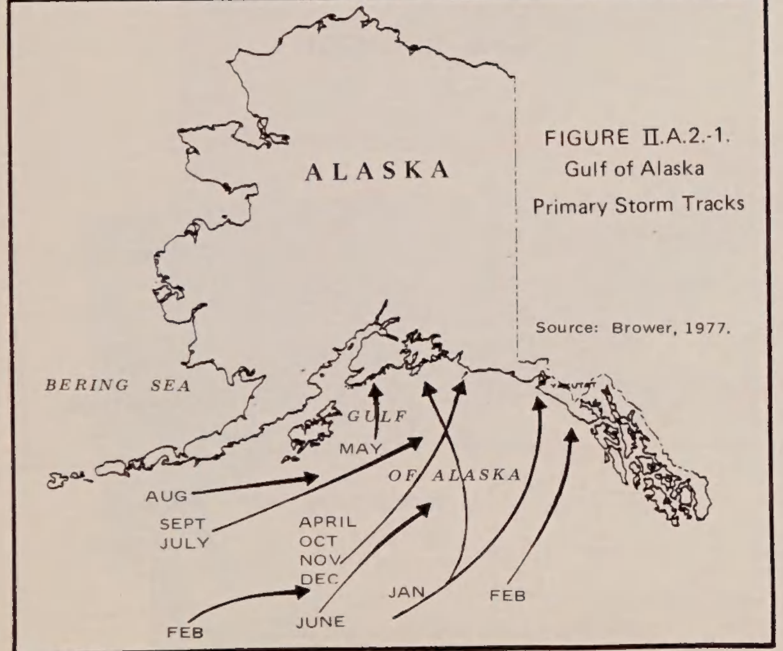
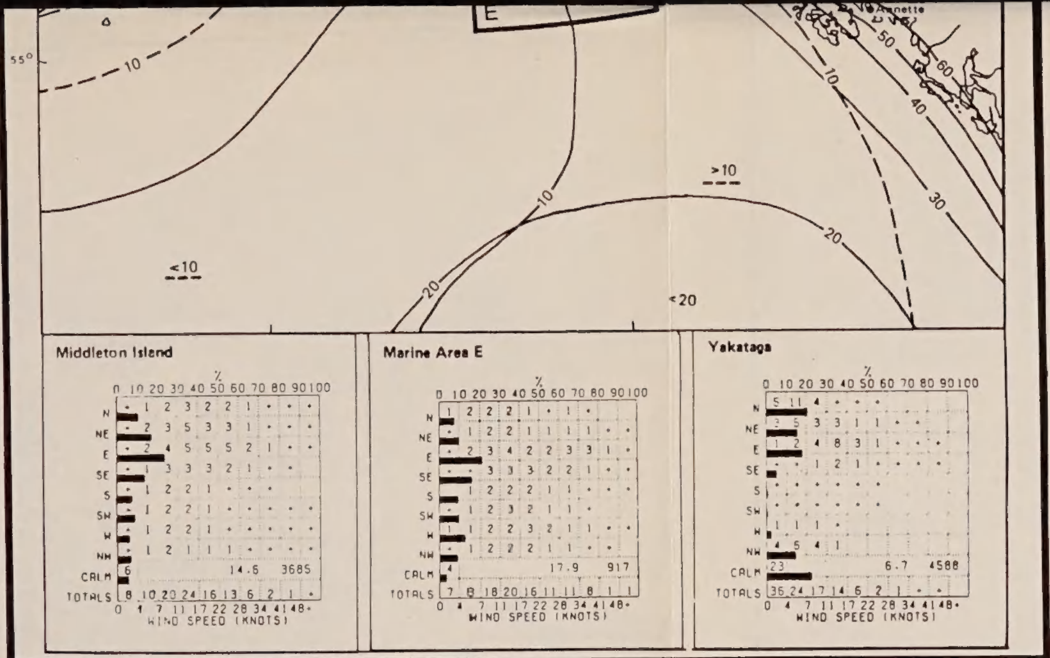


FIGURE II.A.2.-1.
Gulf of Alaska
Primary Storm Tracks

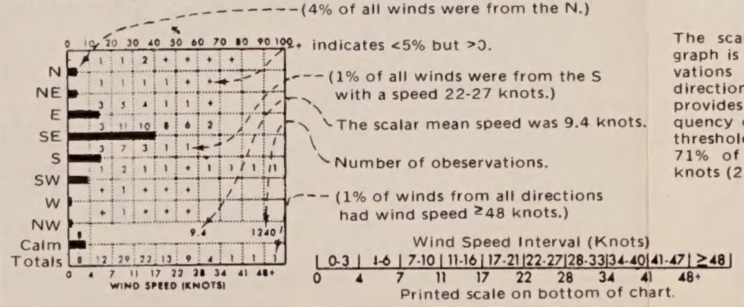
Source: Brower, 1977.



LEGEND

Wind speed/direction

Direction frquency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.



Map — Wind speed thresholds

—— Percent frequency of wind speed ≤10 knots (≤12 mph)

– – – – Percent frequency of wind speed ≥34 knots (≥39 mph)

The scalar mean wind speed on the graph is based on the number of observations reporting a wind speed with direction. The sum of the totals line provides the cumulative percent frequency of wind speed below a selected threshold value. In the example graph, 71% of all winds were less than 17 knots (20 mph).

Source: Brower, W.A., Jr., H.W. Searby, J.L. Wise. Climatic Atlas, Outer Continental Shelf Waters and Coastal Regions of Alaska; Vol. 1. Gulf of Alaska Arctic Environmental Information and Data Center (AEIDC). University of Alaska, Anchorage and U.S. National Climatic Center, Ashville, North Carolina, 1977.

out to sea over the warmer, oceanic water. Wind velocities up to 100 knots can be encountered during these unexpected, brief phenomena. Katabatic winds often blow counter to the prevailing wave directions and produce steep, rough seas. Their influence dissipates rapidly and seldom extends over 20-25 miles seaward. Katabatic winds usually occur during the winter and at night during the summer.

The meteorological conditions favorable to the development of "katabatic" winds usually last from 3 to 4 days. These highly localized winds funnel through topographical depressions along the coast under moderate coastal southeast winds. Although the coastal wind patterns are very complex, with many local characteristics, the synoptic coastal winds show a distinct bimodality in an east-west direction paralleling the coastline.

Interaction between the regional weather conditions and the local coastal weather processes can result in weather patterns that vary from location to location. Only in the latter years have systematic field efforts begun to yield quantitative data to unravel and separate the essential driving mechanisms of the coastal weather. A contaminant spill trajectory

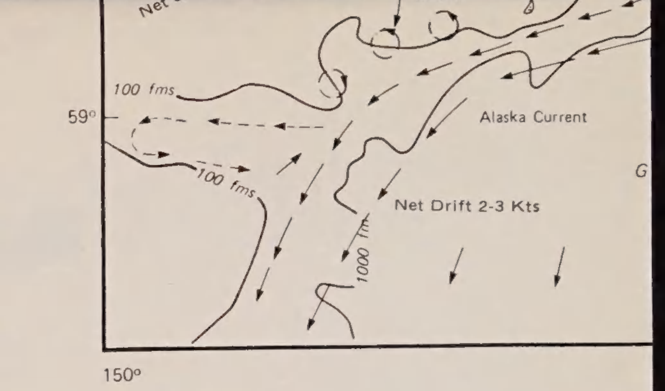


Figure II.A.2.-4. Net Drift of Surface

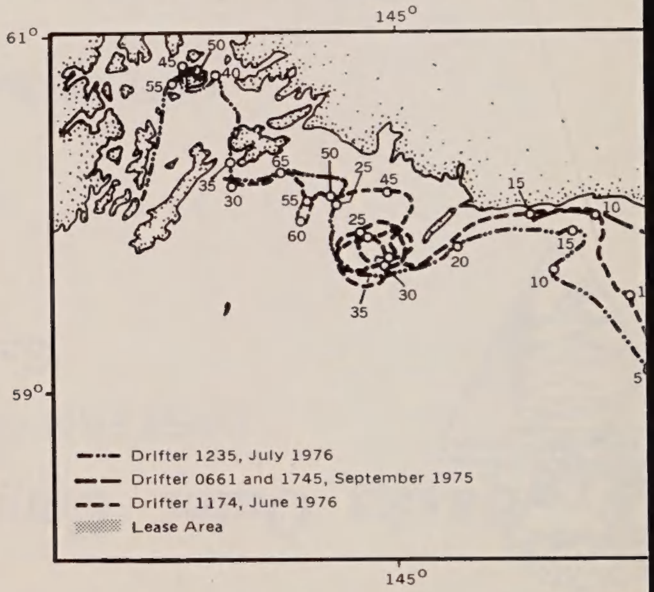
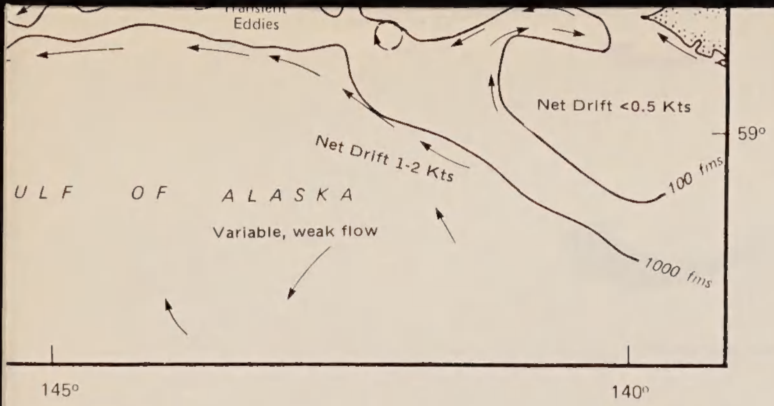
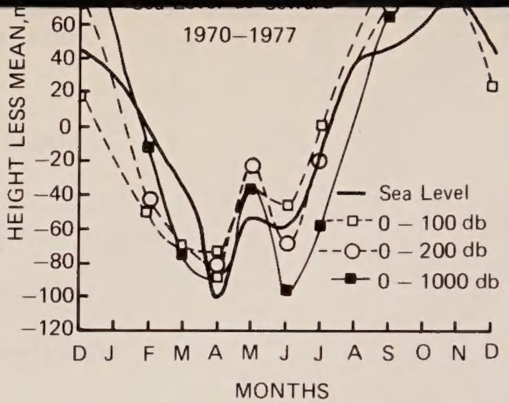


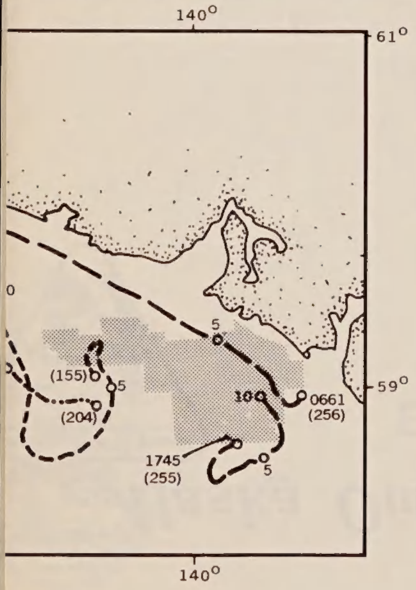
Figure II.A.2.-6. Satellite Tracked Drifting (cum
Trajectories (Royer et. al., 197



Currents in the Northern Gulf of Alaska (Royer, 1979)



Sea level, dynamic height, and precipitation cycles for south coast of Alaska (Royer, 1978)



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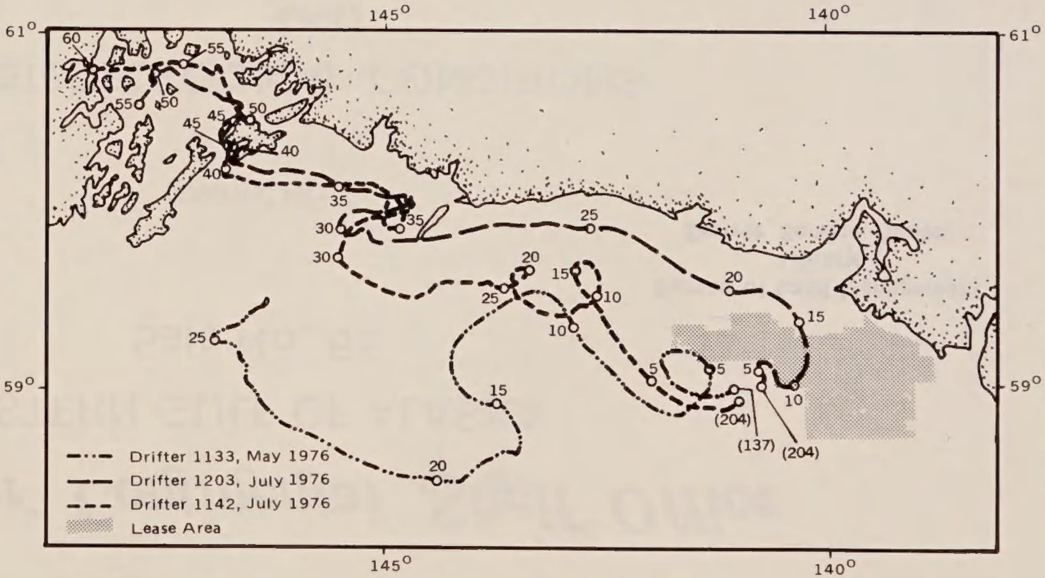

Figure II.A.2.-7. Satellite Tracked Drifting (cumulative number of days) Bouy Trajectories (Royer et. al., 1979)

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Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

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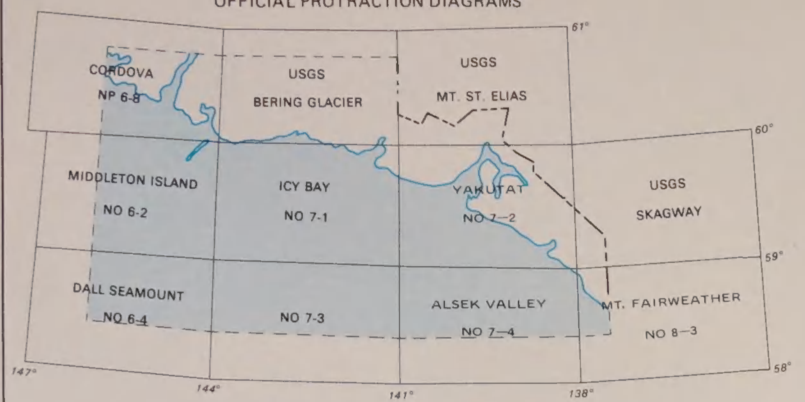
GRAPHIC NO. 3

MARINE HABITATS AND FOOD WEB RESOURCES

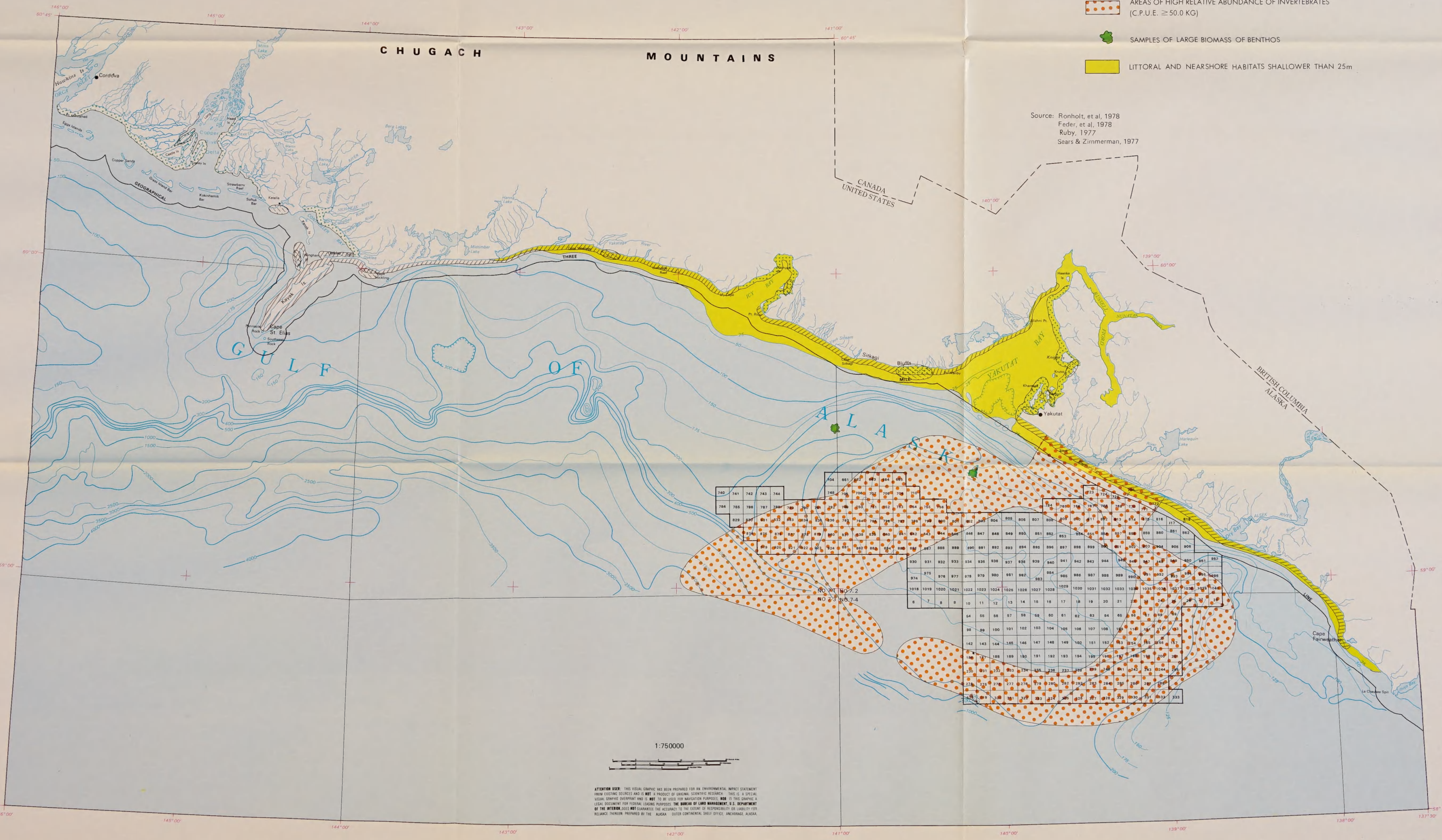
▨	EROSIONAL SHORELINES ON WHICH OIL WOULD PROBABLY PERSIST FOR LESS THAN A YEAR
░	DEPOSITIONAL SHORELINES ON WHICH OIL MAY PERSIST FOR OVER A YEAR
▧	SECTIONS OF SHORELINE WITH DENSE BIOLOGICAL COVER
●	AREAS OF HIGH RELATIVE ABUNDANCE OF INVERTEBRATES (C.P.U.E. ≥50.0 KG)
♣	SAMPLES OF LARGE BIOMASS OF BENTHOS
🟨	LITTORAL AND NEARSHORE HABITATS SHALLOWER THAN 25m

Source: Ronholt, et al, 1978
Feder, et al, 1978
Ruby, 1977
Sears & Zimmerman, 1977

COVERAGE DIAGRAM FOR BLM OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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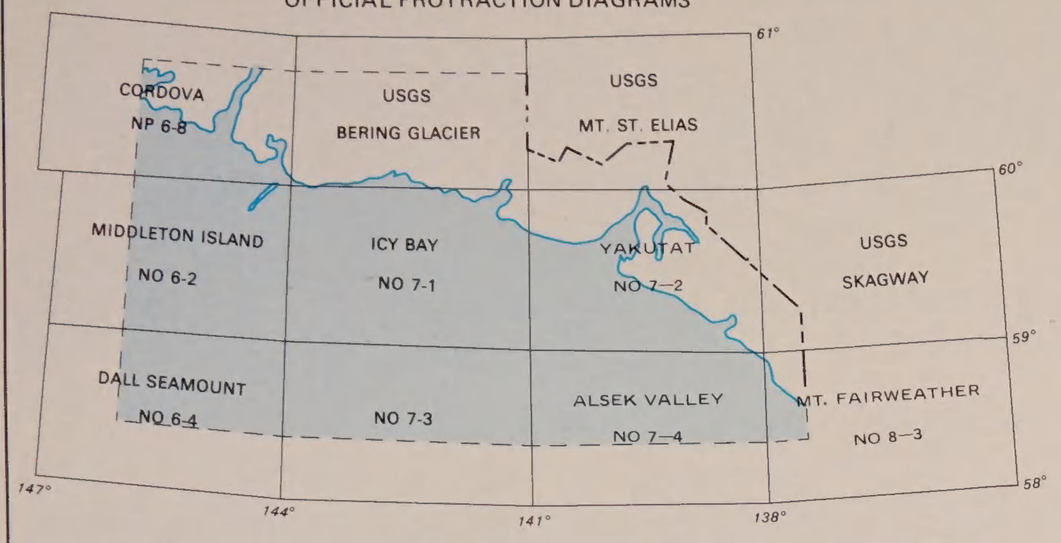
WATER DEPTH IN METERS

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



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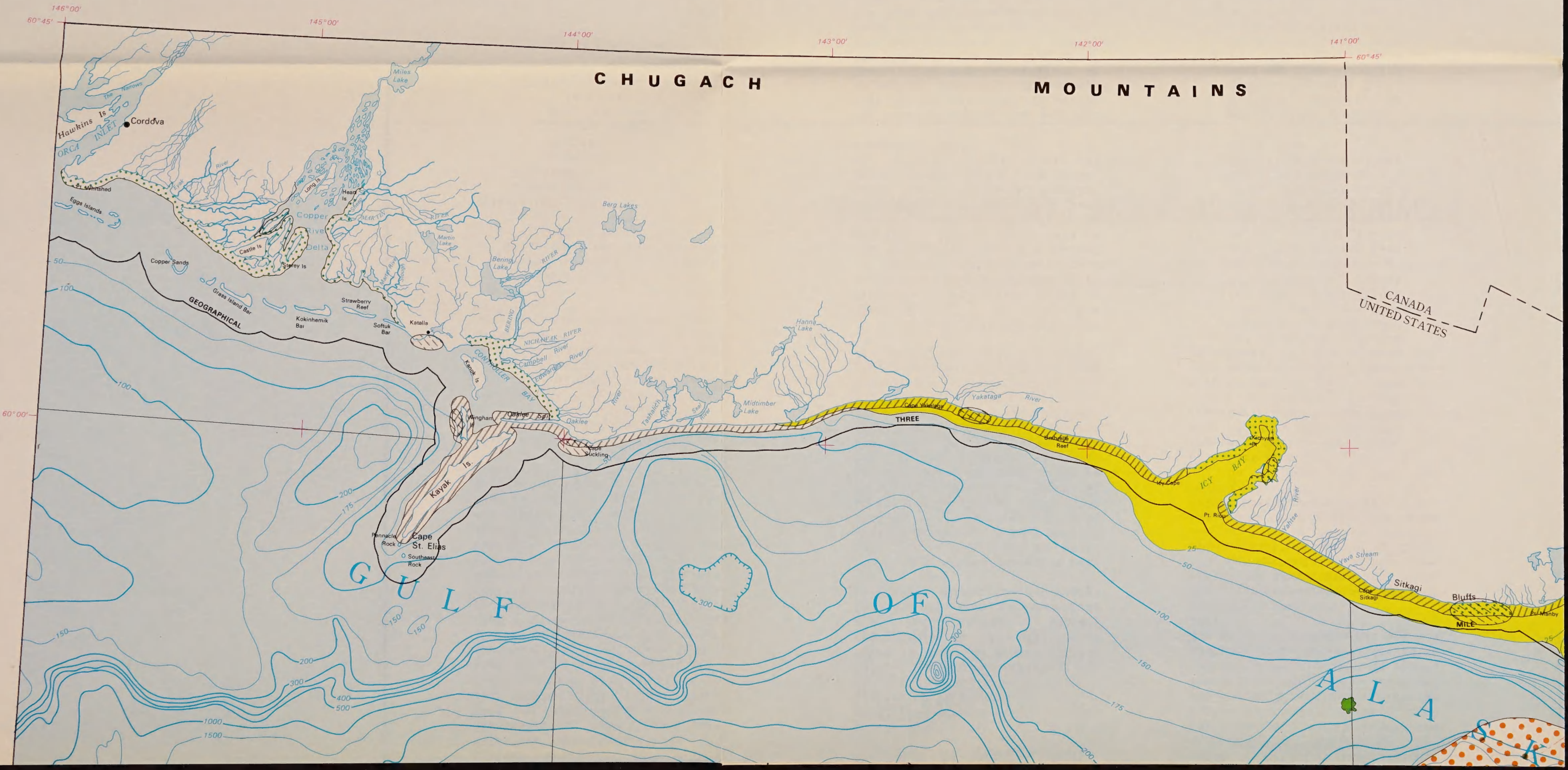

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Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

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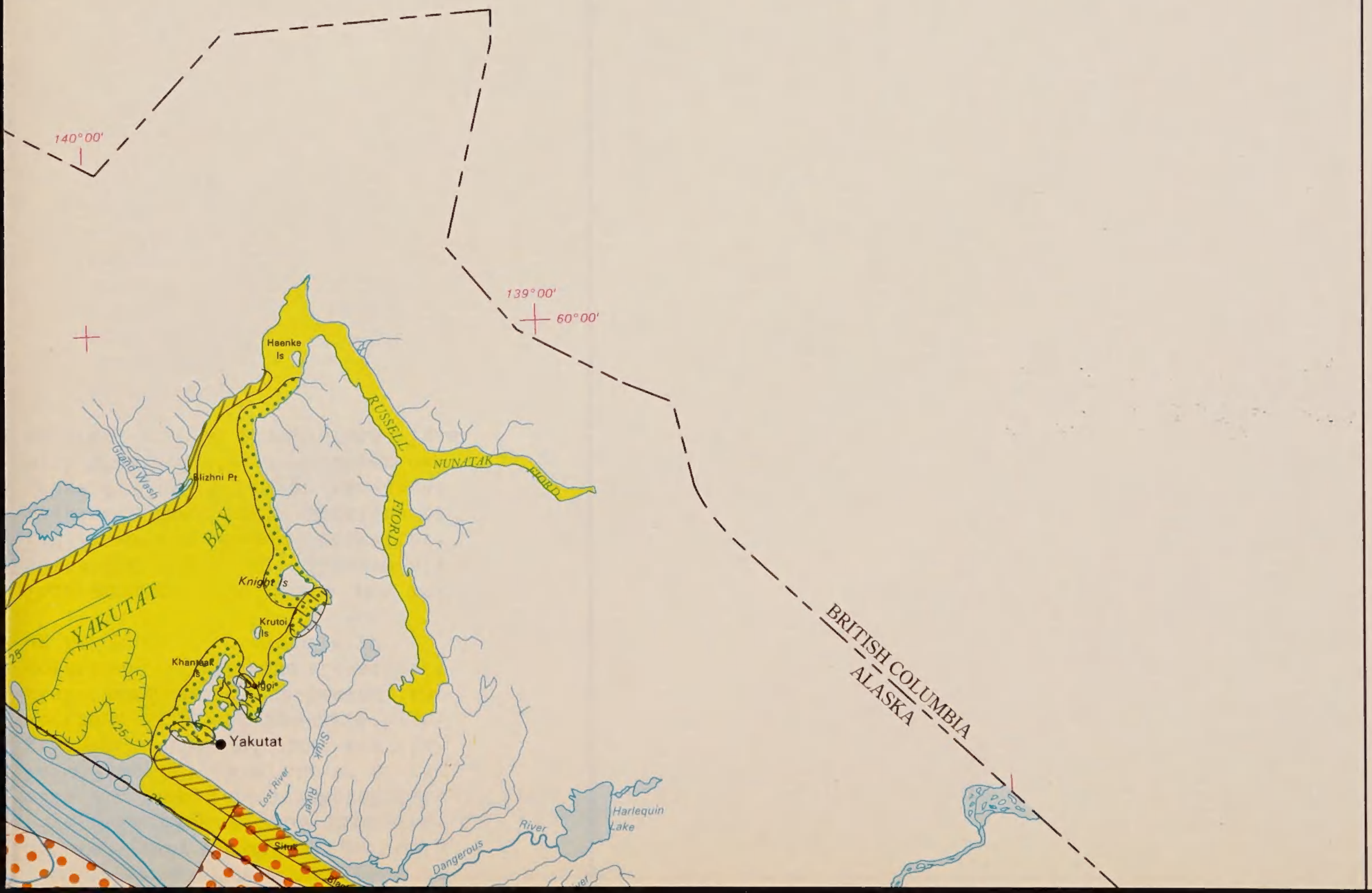
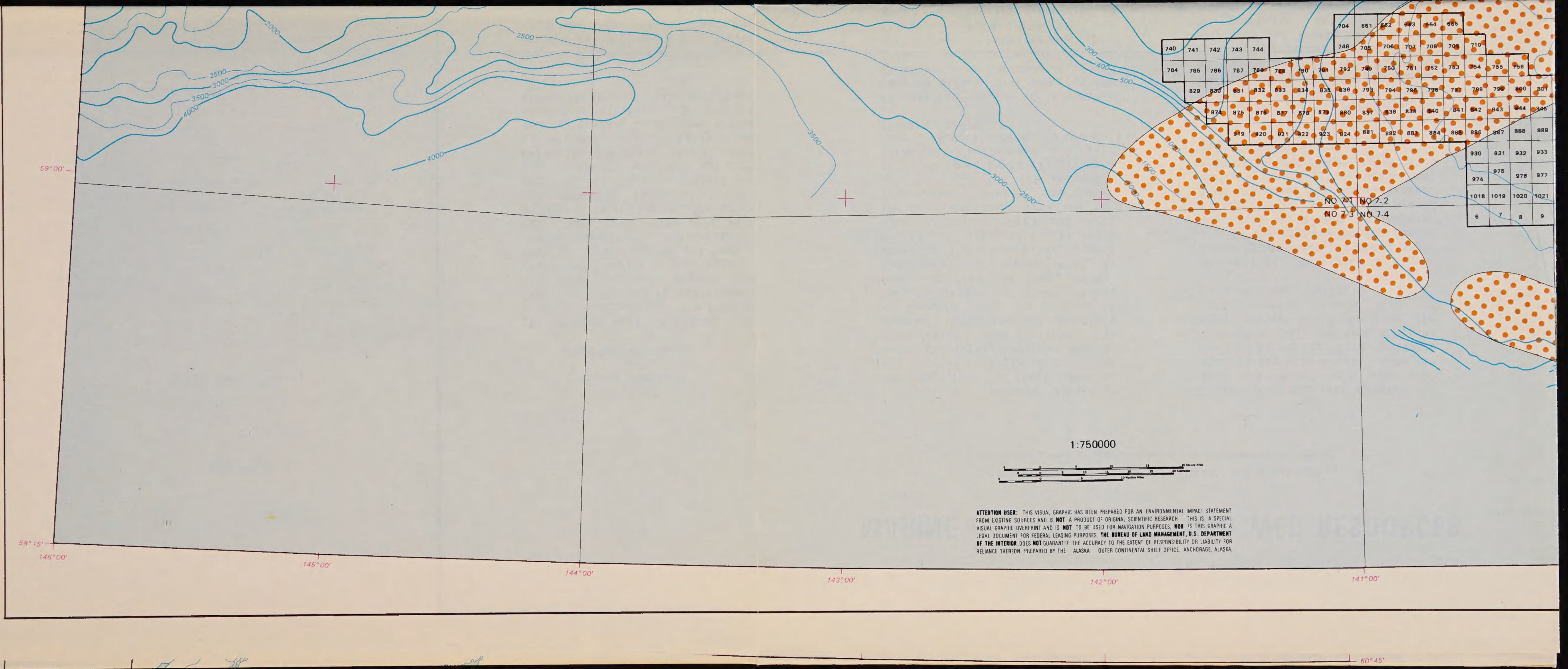
GRAPHIC NO. 3

MARINE HABITATS AND FOOD WEB RESOURCES

▨	EROSIONAL SHORELINES ON WHICH OIL WOULD PROBABLY PERSIST FOR LESS THAN A YEAR
░	DEPOSITIONAL SHORELINES ON WHICH OIL MAY PERSIST FOR OVER A YEAR
▤	SECTIONS OF SHORELINE WITH DENSE BIOLOGICAL COVER
●	AREAS OF HIGH RELATIVE ABUNDANCE OF INVERTEBRATES (C.P.U.E. ≥ 50.0 KG)
●	SAMPLES OF LARGE BIOMASS OF BENTHOS
🟨	LITTORAL AND NEARSHORE HABITATS SHALLOWER THAN 25m

Source: Ronholt, et al, 1978
Feder, et al, 1978
Ruby, 1977
Sears & Zimmerman, 1977





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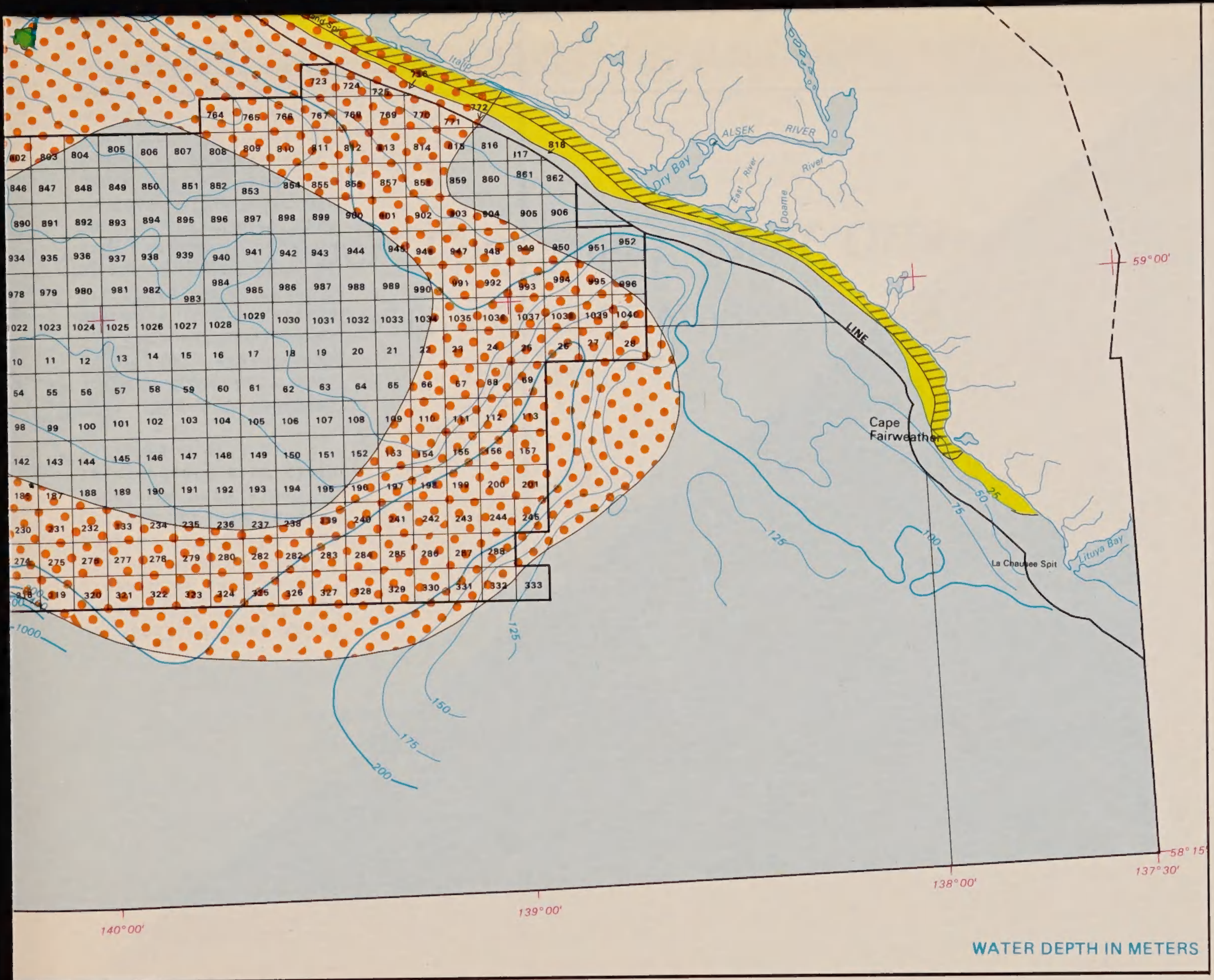

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La Chaussee Spit
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137° 30'
138° 00'
139° 00'
140° 00'
WATER DEPTH IN METERS

GRAPHIC NO. 3

MARINE HABITATS AND FOOD WEB RESOURCES

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

II.B.1.
Marine Habitats and Food Web Resources

The eastern Gulf of Alaska provides a breeding, developing, feeding, and rearing environment for many different migrant and resident marine populations. Most of these species are considered commercially and aesthetically important. The gulf also supports key ecological functions and organisms essential to the survival of these populations. Most of the recreational and commercially important marine fisheries resources are totally dependent on coastal ecosystems during some phase of their life cycles (Alaska Dept. of Fish and Game, 1978).

Many of the commercially and aesthetically important marine organisms have varied food resource requirements. Pacific cod consume molluscs, crustaceans, fish, and echinoderms (Feder, 1978). Flathead sole, halibut, and pollock eat crustaceans and other fish (Smith, et al. 1978). Clams are important because of their high use by birds, sea otters, flatfish, and snow crabs (USDC, 1978). Sea stars are also important and are eaten by king crabs and demersal fish (Feder, 1978). Sea lions, seals, and pigeon guillemots eat benthic fish, invertebrates, and some pelagic organisms. Fur seals prey upon pelagic and demersal fish and occasionally a sea bird. Bald eagles, killer whales, and people are the highest predators of marine organisms.

This section has been divided into separate analyses of 1) the pelagic habitat, including icthyoplanktonic organisms (larval fish or shellfish), 2) the benthic or bottom habitat, and 3) the littoral and nearshore habitat (shallower than 25 m). Typical organisms in each habitat are listed as follows:

Table II.B.1.-1
Marine Habitats and Common Organisms in the Eastern Gulf of Alaska

Pelagic Habitat:
- Phytoplankton
- Zooplankton
  - Copepods
  - Mysids
  - Shrimp Larvae
  - Small Pelagic Invertebrates
- Icthyoplankton
  - Halibut Larvae
  - Herring Larvae

Benthic Habitat:
- Coral
- Oligochaete Worms
- Polychaete Worms
- Cumaceans
- Bivalve Molluscs
  - Clams
  - Scallops
- Crabs
- Flatfish
  - Halibut
  - Flounder

Littoral and Nearshore Habitat:
- Rockweed
- Kelp
- Eelgrass
- Snails
- Mussels
- Crabs
- Salmon fry

a. Pelagic Habitat: Detailed information on this habitat is included in the final environmental impact statement for sale 39, and in the 1978 NOAA Interim Synthesis Report for the Northeast Gulf of Alaska. The latter report includes the recent results of OCSEAP studies on phytoplankton by J.D. Larrence, on zooplankton by R.T. Cooney and D.M. Damkaer, and icthyoplankton by T.S. English. The latter studies have confirmed that there are generally higher concentrations of fish larvae near the coastline and in estuarine waters, such as Yakutat Bay.

b. Benthic Habitats: The organisms in these habitats are related to depth, bottom sediment, turbidity, sediment deposition rates, and currents. In general, diversity and abundance of benthos decreases with depth and distance from shore (Alaska Dept. of Fish and Game, 1978). Catch per unit effort (CPUE), as shown on the graphic, represents weights of organisms caught per a time period. Polychaetes were the most important group of invertebrates having the most species collected (29 percent), followed by molluscs (15 percent), arthropod crustaceans (14 percent), and echinoderms (5 percent) (Feder, 1976).

The inshore shallow shelf benthic infauna differ from those on the shelf break or continental slope. Inshore deposit feeders (worms) predominate (61-65 percent of a sample). Deposit feeders are found in silty clay areas with an abundance of organic matter.

On the shelf break, there are more suspension feeders such as clams, comprising 32 percent of a sample; deposit feeders comprise 26 percent. Suspension feeders are found in sand and gravel and are susceptible to the effects of muds and cuttings. Deposit feeders are more threatened by pollutants within the sediments.

There is a slight change in benthic fauna from east to west. Various groupings can be made of similar organisms and could be useful for monitoring (USDC, 1978). Of the epibenthos, the snow crab is the most abundant organism (48.5 percent of commercial invertebrates). Sea urchins have high densities in canyons, particularly offshore from Kayak Island, Yakutat Bay, and Icy Bay. Other echinoderms are an important part of the epibenthos, as they are food for many predators (Feder, 1978).

c. Littoral and Nearshore Habitats: The shoreline from Cape Puget to Yakutat Bay is 36 percent sand, 21 percent gravel, 20 percent bedrock, 15 percent boulder and rubble, and 8 percent mud (USDC, 1978). Areas with no cover or slope predominate. The only areas with cover and some slope are on Montague, Hinchinbrook, Wooded, Tanker, Elrington, and LaTouche Islands (Sears and Zimmerman, 1977).

The rocky intertidal and nearshore subtidal habitats lead all others in species diversity and density. There is a high variability in the distribution and density of species (Zimmerman, et al., 1977). Rocky areas can more easily recover from oil impingement due to greater wave action. There is a greater risk in fall and winter when the plant canopies are shed. Boulder and gravel beaches have lower primary productivity and species diversity than rock areas. Cleanup is more difficult (Ruby, 1977).

The drift zone is an important area for upland scavengers such as bears, bald eagles, and gulls. The zone consists of clams, crabs, sponges, and snails.

The eastern parts of Yakutat Bay are most susceptible to long-term risk from oil pollution. The coastal area southeast of Yakutat Bay is characterized by many sand spits. However, there are many estuaries behind them, very susceptible to long-term residence of oil.

The intertidal and mudflat areas are very rich in numbers of species (USDC, 1978). The species are preyed upon extensively by sandpipers and diving ducks. Birds must use the flats during winter and early spring. Exposure of these habitats to freezing and to oil slicks that might come onshore could be serious (D. C. Lees, Dames and Moore, Anchorage, Alaska).

Macrophytes are very diverse and lush and depend upon hard substances for attachment. Some attach to barnacles (Lees, personal communication), but severe winter wave action could dislodge the entire system (Alaska Dept. of Fish and Game, 1978).

Macrophytes contribute a significant percentage, if not a majority of the primary production of the Gulf of Alaska (Zimmerman, et al, 1977). Macrophytes provide food and cover for invertebrates. Fish, waterfowl, and marine mammals also use these areas rich with these species.

Vegetation also contributes to the detrital food chain. In the rocky intertidal zone, the plants are multilayered. The canopy is composed of annual bull kelp, and the next two layers are composed of perennials. The shallow alterations of peak growth periods may avoid competitive interactions.

The rocky sublittoral zone is dominated by benthic marine plants, which form a continuation of the intertidal zone. Kelp dominates and can extend 5-6 km from shore, although it is usually limited to the upper 25 m (Rosenthal and Lees, 1977).

The coastline morphology and sedimentation characteristics along the eastern Gulf of Alaska have been classified by Ruby (1977).

Part of the description from Ruby's work appears below:

> On the basis of field work done during 1969-71, and during the summer of 1975, the study area has been classified according to coastal morphology into three major classes: 1) Erosional, 2) depositional, and 3) neutral. It has been further subdivided into 11 subclasses based on finer distinctions of morphology, recent history, sedimentology and active process parameters. Of the 896 km studied, neutral shorelines represent 58 percent; erosional shorelines, 23 percent; and depositional shorelines, 19 percent.
>
> Use of these geomorphic baseline studies, in conjunction with field work at five oilspills in various coastal environments, has permitted an evaluation of potential oilspill impacts along the shoreline environments, of the Gulf of Alaska. This oilspill vulnerability is based primarily on the longevity of spilled oil within a particular geomorphic subenvironment. Longevity is generally related to the intensity of marine processes, sediment size, and transport trends. The relative biologic sensitivity of each subenvironment has also been considered and is used to modify the index ratings.
>
> Of the 1773.4 km of shoreline classified, 62 percent falls into high-risk categories (7-10 on the oilspill risk classification). Oil spilled into these environments will probably remain there for a period of a few years to more than 10 years. The lower risk classes of 1-4 comprise 24 percent of the shoreline. Oil spilled into these areas will usually be cleaned by natural processes within about 6 months. Finally, 24 percent of the coastline has been given an intermediate risk classification of 5-6.
>
> More than 500 sediment samples have been analyzed for grain size and compositional parameters. Trend analyses of these data support accepted principles of grain size fining and quartz enrichment with increased transport distance from sediment source. Additionally, these trend analyses support, in all cases, geomorphic and computed delineations of dominant sediment transport direction.

Sections of the coastline with high-risk classes and with low-risk classes (or susceptibility to oilspills), are shown on the graphic. Some of the low-risk sections of coastline have high-risk habitats just behind the coastline, such as southeast of Yakutat.

This graphic also shows the results of Sears and Zimmerman's (1977) work on coastal characterization. The coastal sections of dense biological cover are areas with high numbers of food web organisms, such as mussels and algae.

GRAPHIC NO. 3

MARINE HABITATS AND FOOD WEB RESOURCES

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

II.B.1.
Marine Habitats and Food Web Resources

The eastern Gulf of Alaska provides a breeding, developing, feeding, and rearing environment for many different migrant and resident marine populations. Most of these species are considered commercially and aesthetically important. The gulf also supports key ecological functions and organisms essential to the survival of these populations. Most of the recreational and commercially important marine fisheries resources are totally dependent on coastal ecosystems during some phase of their life cycles (Alaska Dept. of Fish and Game, 1978).

Many of the commercially and aesthetically important marine organisms have varied food resource requirements. Pacific cod consume molluscs, crustaceans, fish, and echinoderms (Feder, 1978). Flathead sole, halibut, and pollock eat crustaceans and other fish (Smith, et al. 1978). Clams are important because of their high use by birds, sea otters, flatfish, and snow crabs (USDC, 1978). Sea stars are also important and are eaten by king crabs and demersal fish (Feder, 1978). Sea lions, seals, and pigeon guillemots eat benthic fish, invertebrates, and some pelagic organisms. Fur seals prey upon pelagic and demersal fish and occasionally a sea bird. Bald eagles, killer whales, and people are the highest predators of marine organisms.

This section has been divided into separate analyses of 1) the pelagic habitat, including icthyoplanktonic organisms (larval fish or shellfish), 2) the benthic or bottom habitat, and 3) the littoral and nearshore habitat (shallower than 25 m). Typical organisms in each habitat are listed as follows:

Table II.B.1.-1
Marine Habitats and Common Organisms in the Eastern Gulf of Alaska

Pelagic Habitat:
- Phytoplankton
- Zooplankton
  - Copepods
  - Mysids
  - Shrimp Larvae
  - Small Pelagic Invertebrates
- Icthyoplankton
  - Halibut Larvae

b. Benthic Habitats: The organisms in these habitats are related to depth, bottom sediment, turbidity, sediment deposition rates, and currents. In general, diversity and abundance of benthos decreases with depth and distance from shore (Alaska Dept. of Fish and Game, 1978). Catch per unit effort (CPUE), as shown on the graphic, represents weights of organisms caught per a time period. Polychaetes were the most important group of invertebrates having the most species collected (29 percent), followed by molluscs (15 percent), arthropod crustaceans (14 percent), and echinoderms (5 percent) (Feder, 1976).

The inshore shallow shelf benthic infauna differ from those on the shelf break or continental slope. Inshore deposit feeders (worms) predominate (61-65 percent of a sample). Deposit feeders are found in silty clay areas with an abundance of organic matter.

On the shelf break, there are more suspension feeders such as clams, comprising 32 percent of a sample; deposit feeders comprise 26 percent. Suspension feeders are found in sand and gravel and are susceptible to the effects of muds and cuttings. Deposit feeders are more threatened by pollutants within the sediments.

There is a slight change in benthic fauna from east to west. Various groupings can be made of similar organisms and could be useful for monitoring (USDC, 1978). Of the epibenthos, the snow crab is the most abundant organism (48.5 percent of commercial invertebrates). Sea urchins have high densities in canyons, particularly offshore from Kayak Island, Yakutat Bay, and Icy Bay. Other echinoderms are an important part of the epibenthos, as they are food for many predators (Feder, 1978).

c. Littoral and Nearshore Habitats: The shoreline from Cape Puget to Yakutat Bay is 36 percent sand, 21 percent gravel, 20 percent bedrock, 15 percent boulder and rubble, and 8 percent mud (USDC, 1978). Areas with no cover or slope predominate. The only areas with cover and some slope are on Montague, Hinchinbrook, Wooded, Tanker, Elrington, and LaTouche Islands (Sears and Zimmerman, 1977).

The rocky intertidal and nearshore subtidal habitats lead all others in species diversity and density. There is a high variability in

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Macrophytes contribute a significant percentage, if not a majority of the primary production of the Gulf of Alaska (Zimmerman, et al, 1977). Macrophytes provide food and cover for invertebrates. Fish, waterfowl, and marine mammals also use these areas rich with these species.

Vegetation also contributes to the detrital food chain. In the rocky intertidal zone, the plants are multilayered. The canopy is composed of annual bull kelp, and the next two layers are composed of perennials. The shallow alterations of peak growth periods may avoid competitive interactions.

The rocky sublittoral zone is dominated by benthic marine plants, which form a continuation of the intertidal zone. Kelp dominates and can extend 5-6 km from shore, although it is usually limited to the upper 25 m (Rosenthal and Lees, 1977).

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    Herring Larvae

Benthic Habitat:
- Coral
- Oligochaete Worms
- Polychaete Worms
- Cumaceans
- Bivalve Molluscs
  - Clams
  - Scallops
- Crabs
- Flatfish
  - Halibut
  - Flounder

Littoral and Nearshore Habitat:
- Rockweed
- Kelp
- Eelgrass
- Snails
- Mussels
- Crabs
- Salmon fry

a. Pelagic Habitat: Detailed information on this habitat is included in the final environmental impact statement for sale 39, and in the 1978 NOAA Interim Synthesis Report for the Northeast Gulf of Alaska. The latter report includes the recent results of OCSEAP studies on phytoplankton by J.D. Larrence, on zooplankton by R.T. Cooney and D.M. Damkaer, and icthyoplankton by T.S. English. The latter studies have confirmed that there are generally higher concentrations of fish larvae near the coastline and in estuarine waters, such as Yakutat Bay.

the distribution and density of species (Zimmerman, et al., 1977). Rocky areas can more easily recover from oil impingement due to greater wave action. There is a greater risk in fall and winter when the plant canopies are shed. Boulder and gravel beaches have lower primary productivity and species diversity than rock areas. Cleanup is more difficult (Ruby, 1977).

The drift zone is an important area for upland scavengers such as bears, bald eagles, and gulls. The zone consists of clams, crabs, sponges, and snails.

The eastern parts of Yakutat Bay are most susceptible to long-term risk from oil pollution. The coastal area southeast of Yakutat Bay is characterized by many sand spits. However, there are many estuaries behind them, very susceptible to long-term residence of oil.

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Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

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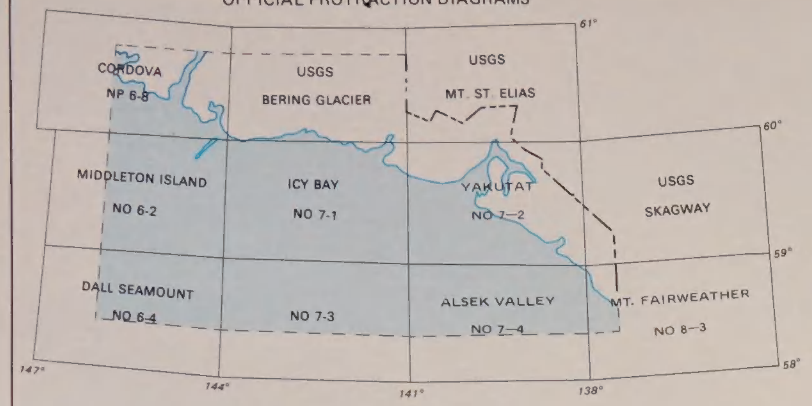
GRAPHIC NO. 4a

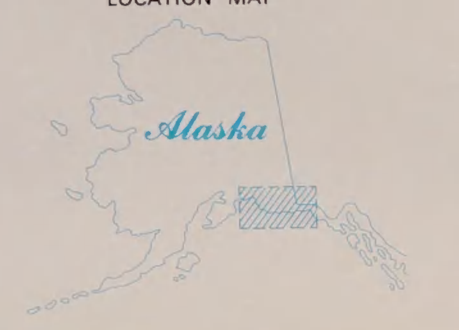
MAJOR FINFISH DISTRIBUTION

Cape Fairweather To Cape Suckling

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



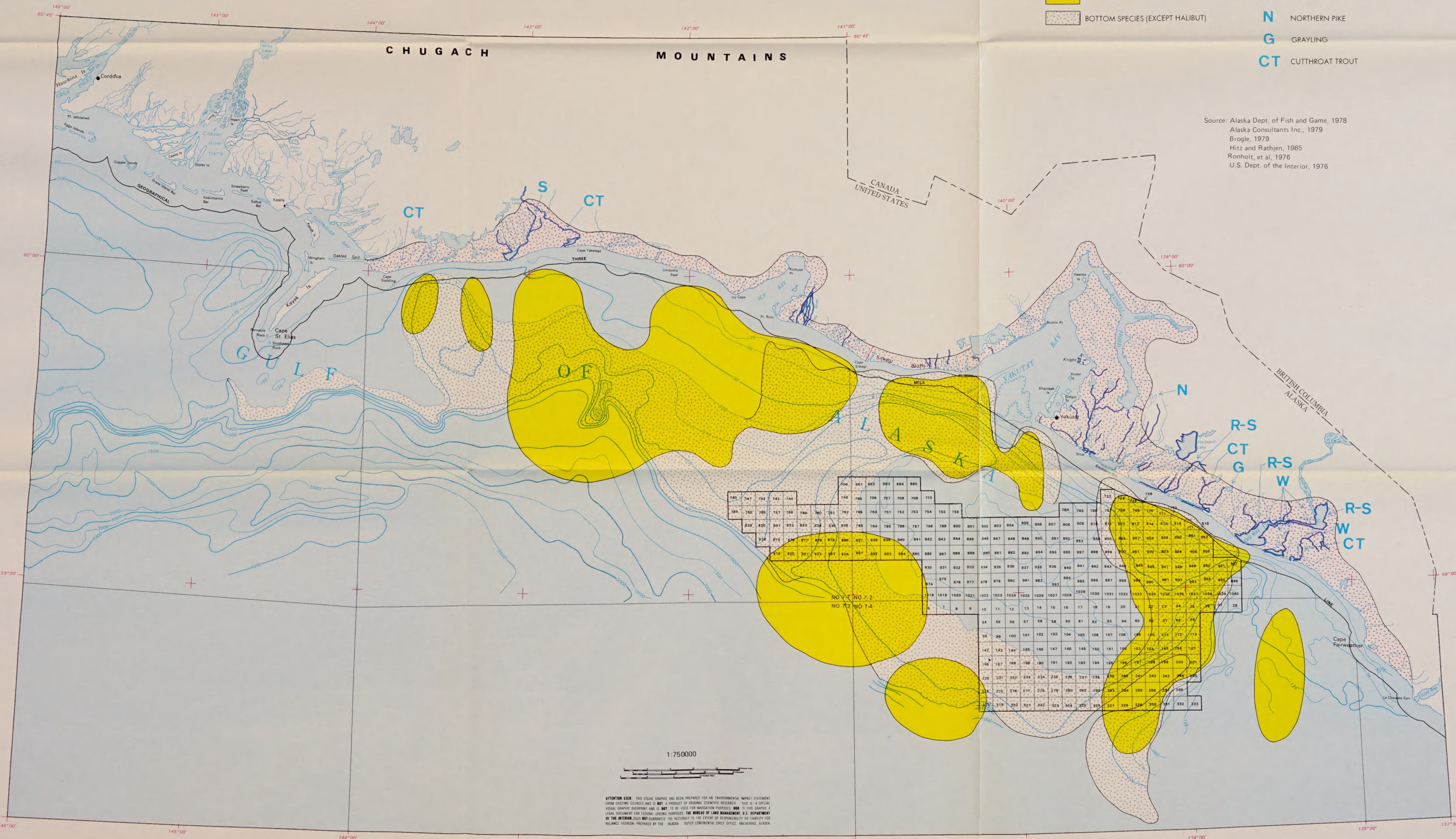
Commercial / Sport or Subsistence Species

⟹	MAJOR SALMON SPAWNING STREAMS
→	MINOR SALMON SPAWNING STREAMS
■	HALIBUT
▨	BOTTOM SPECIES (EXCEPT HALIBUT)

Non-Commercial / Sport or Subsistence Species

S	STEELHEAD TROUT
R	RAINBOW TROUT
▨	DOLLY VARDEN / ARCTIC CHAR
W	WHITEFISH SPECIES
N	NORTHERN PIKE
G	GRAYLING
CT	CUTTHROAT TROUT

Source: Alaska Dept. of Fish and Game, 1978
Alaska Consultants Inc., 1979
Brogle, 1979
Hitz and Rathjen, 1965
Ronholt, et al, 1976
U.S. Dept. of the Interior, 1976



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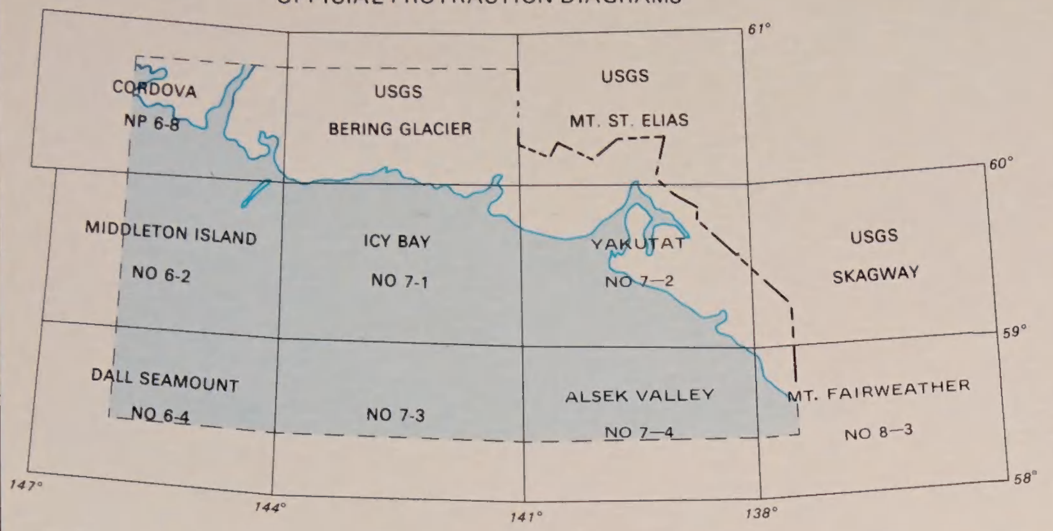
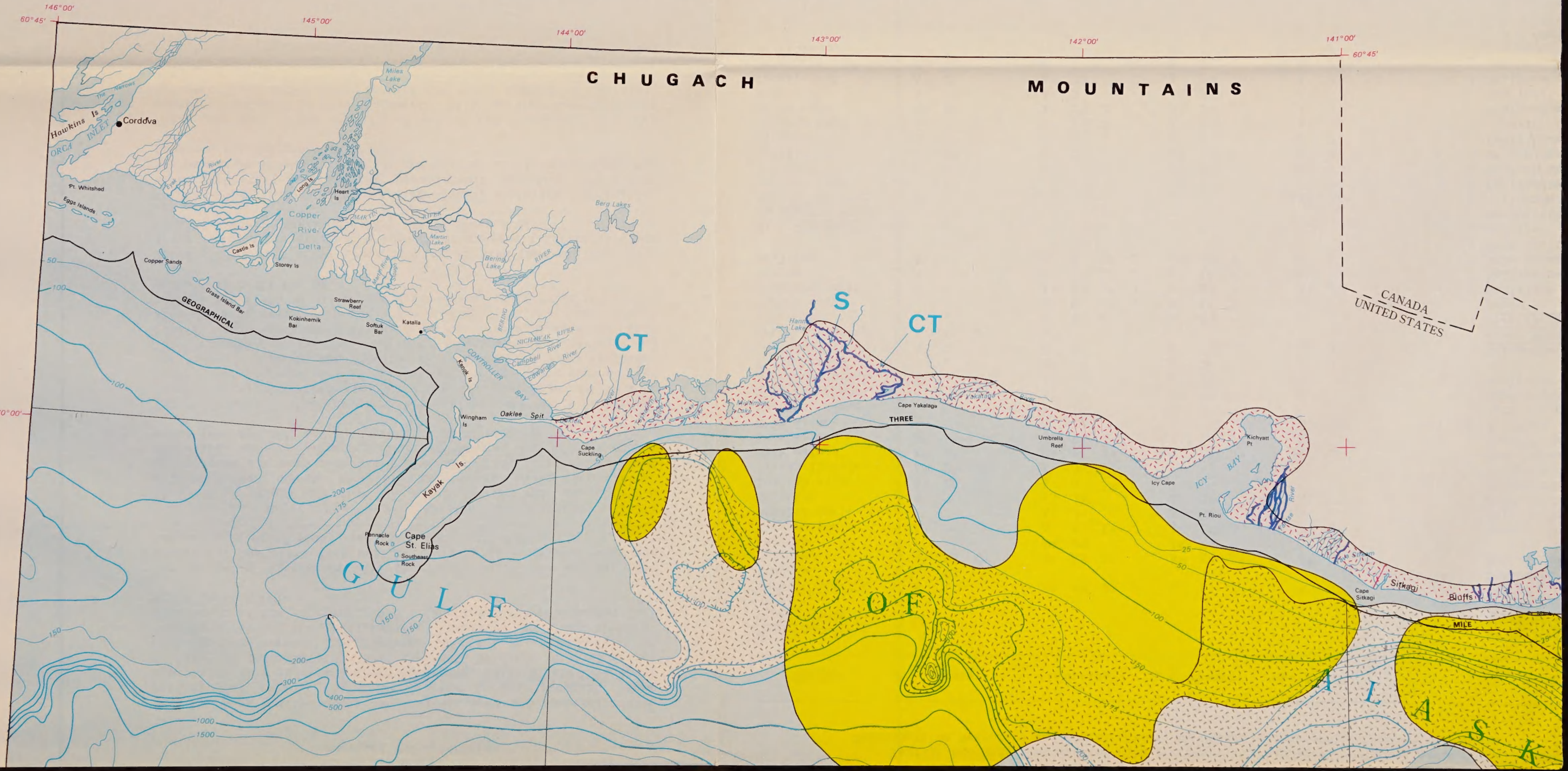
WATER DEPTH IN METERS

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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Alaska Outer Continental Shelf Office

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EASTERN GULF OF ALASKA
Sale No. 55

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GRAPHIC NO. 4a

MAJOR FINFISH DISTRIBUTION
Cape Fairweather To Cape Suckling

Commercial/Sport or Subsistence Species

- MAJOR SALMON SPAWNING STREAMS
- MINOR SALMON SPAWNING STREAMS
- 🟨 HALIBUT
- ▨ BOTTOM SPECIES (EXCEPT HALIBUT)

Non-Commercial/Sport or Subsistence Species

- S STEELHEAD TROUT
- R RAINBOW TROUT
- ▨ DOLLY VARDEN/ARCTIC CHAR
- W WHITEFISH SPECIES
- N NORTHERN PIKE
- G GRAYLING
- CT CUTTHROAT TROUT

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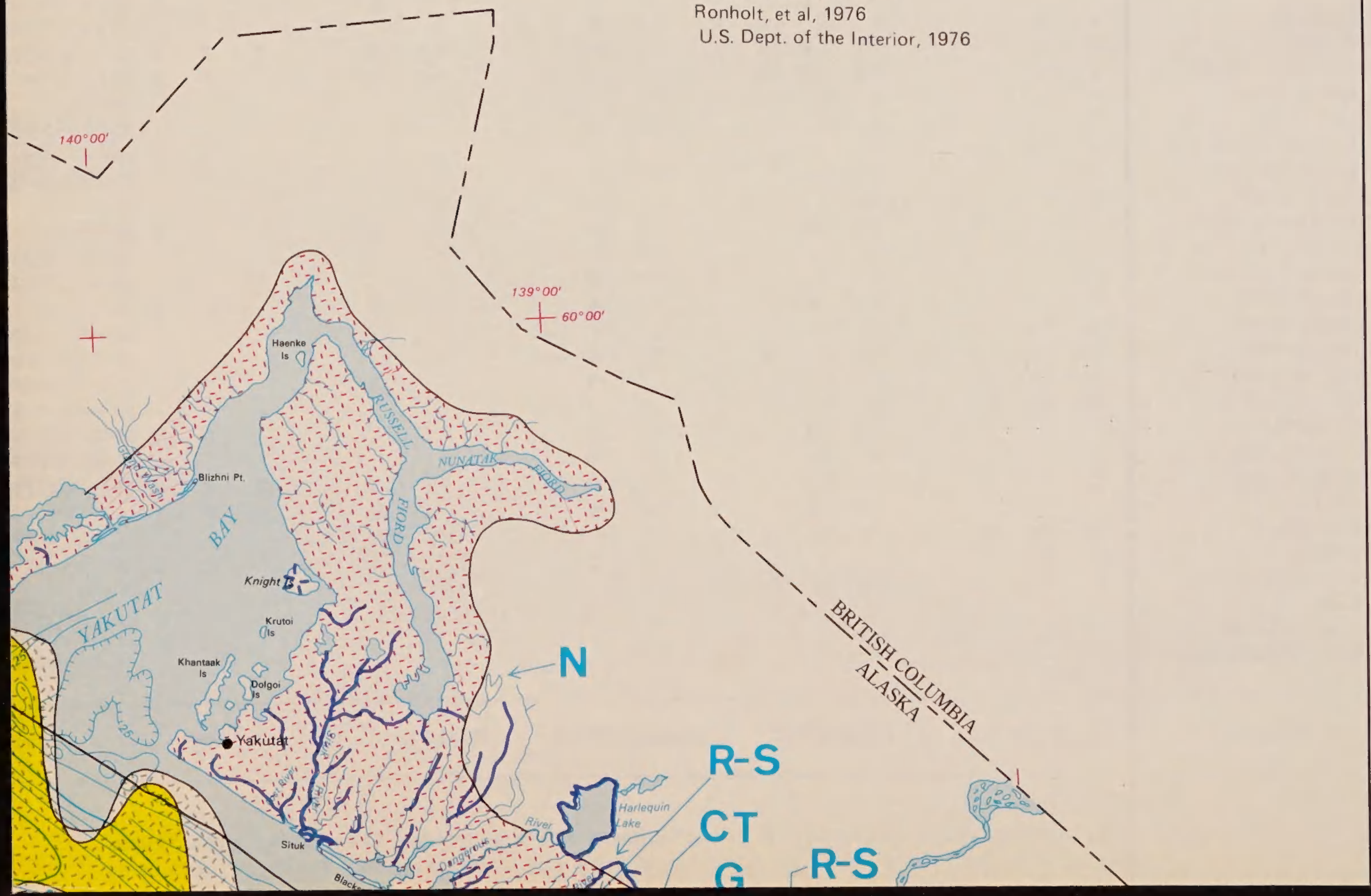

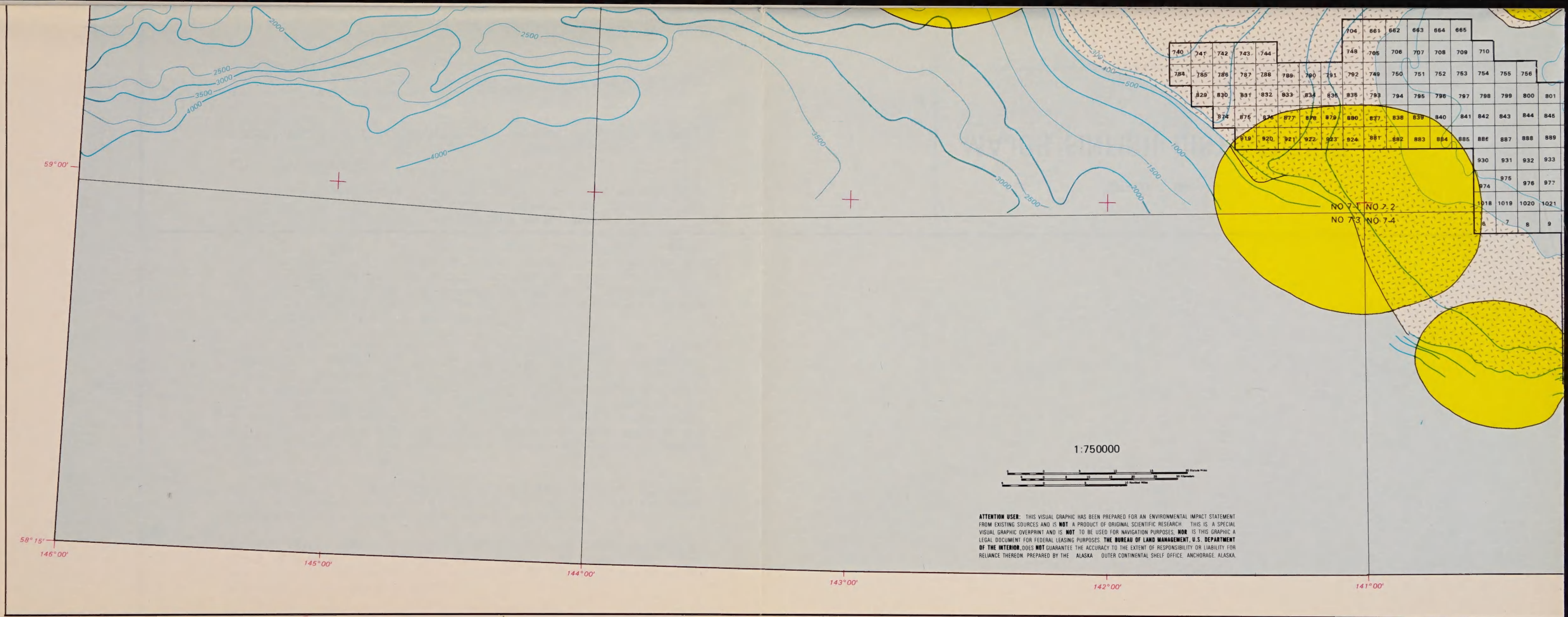

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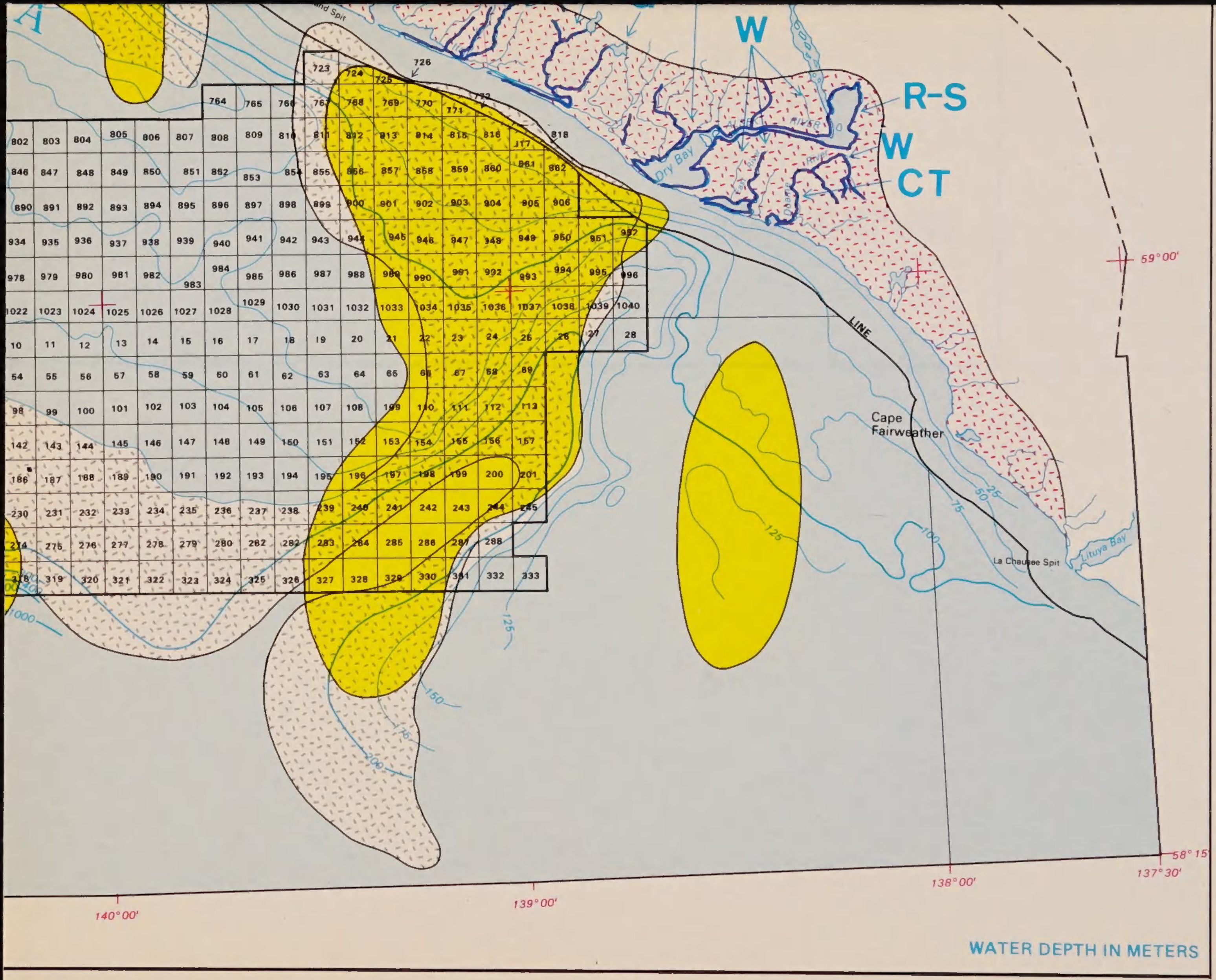
ecosystems.


W
R-S
W
CT
Dry Bay
River
Cape Fairweather
LINE
La Chaussee Spit
Lituya Bay
59°00'
58°15'
140°00'
139°00'
138°00'
137°30'
25
50
75
100
125
150
175
200
1000
WATER DEPTH IN METERS

GRAPHIC NO. 4a

MAJOR FINFISH DISTRIBUTION

DESCRIPTION OF THE AFFECTED ENVIRONMENT
Description of the Biological Characteristics of the Affected Environment

II.B.2.
Commercial and Sport Fish

Much has been written about the various sport and commercial fish species that inhabit the area affected by this proposal. Some sources of this information are Rosenberg, 1972; Alaska Department of Fish and Game (ADF&G), 1978; the ADF&G Wildlife Notebook Series published at various times between 1968 and 1971; University of Alaska, 1974; the U.S. Department of Commerce, 1977; and the U.S. Department of the Interior, 1976. (See reference section for full title descriptions.)

The following discussion will show those areas and seasons when commercial and sport fish are particularly at risk from petroleum exploration, development, and production activities.

a. Major Fin and Shellfish Distribution: Table II.B.2.a.-1 points out that the eggs, larvae, and juveniles are more dependent on the nearshore and benthic areas than adults. These forms are also more vulnerable to population reductions from pollution, habitat alterations or destruction, and natural phenomenon (see sec. III.A.2.b, Impacts on Fish Resources).

Table II.B.2.a-1 also shows the critical seasons and life history stages of various fish species using the nearshore and benthic areas. For purposes of this discussion, the nearshore area is from the hightide line to the 25-meter water depth (see above graphic). This encompasses critical habitats for spawning, rearing, and feeding, and contains migration routes for many fish species. This area is also where kelp and other plants live, and where water-soluble fractions of oil in the water column could begin to come in contact with the bottom.

Table II.B.2.a.-2 shows other species of fish that use the nearshore and benthic areas with apparently no special critical times or life history stages when they are in these areas.

Rainbow trout, arctic grayling, lake trout, whitefish, and burbot, along with other fish species, also inhabit the area. These fish are primarily freshwater species and will be little affected by the proposed oil and gas activities.

There are many other species of marine and freshwater fish not named or discussed in this statement. Although they have no direct economic importance, these species are vital members of the local ecosystems.

For additional information on fisheries, refer to Graphics Nos.4a, 4b, and 5, Commercial Fisheries.

Table II.B.2.a.-1
Finfish and Shellfish Species With Species
Dependence on Nearshore and Benthic Areas, by Season

Species	Winter	Spring	Summer	Fall
With Dependence On Nearshore Areas				
Pacific herring	E L	A* E* J*	A L J	A J
Lingcod	A E*			
Surf smelt	A* E* L*	A* E* L*	A* E* L*	A* E* L*
Capelin		A* E*	A* E*	
Rainbow smelt	A J	A E L* J	A L* J	A J
Longfin smelt		A J*	A J*	A
Eulachon	A J	A J*	A J*	A J
English sole	A* E* L*	L J		
Starry flounder	A* E* L*	L J		
Pink salmon	E* L*	E* L* J*	A E* J*	E* J
Chum salmon	E* L*	E* L* J*	A E* J*	E* J
Coho salmon	A	A J*	A J*	A J
Sockeye salmon		A J*	A J*	
Chinook salmon	A	A J*	A J*	A
Steelhead trout	A	A J*	A J*	A
Dolly Varden	A	J*	A J*	A J
Cutthroat trout	A* J	A J*	A J*	A J
Pacific sandfish	A E* J	J		
King crab		A E L*	A L*	
Tanner crab	J	A E L* J	A L* J	J
Dungeness crab	A J	A E L* J	A L* J	A J
Shrimp	A J	A E L* J	A L* J	A J
Scallops	A J	A E L* J	A L* J	A J
With Dependence on Benthic Areas				
Pacific herring	A* J			A J
Pacific sand lance	A E* J	A J	A J	A J
Pacific cod	A E* J	A J	A J	A J
Lingcod	A E* J	A J	A J	A J
Petrale sole	A* E* L J	A L J	A J	A J
Dover sole	A* E* L J	A L J	A J	A J
King crab	A J	A J	A J	A J
Tanner crab	A J	A J	A J	A J
Dungeness crab	A J	A J	A J	A J
Scallops	A J	A J	A J	A J

A = Adults
E = Eggs
L = Larval
J = Juvenile
* = Critical Periods

Source: U.S. Dept. of Commerce, 1978

Table II.B.2.a.-2
Fish Species Using the Nearshore and Benthic
Areas With No Special Dependence, by Season

Species	Winter	Spring	Summer	Fall
Using The Nearshore Areas With No Special Dependence				
Sablefish	E L	L	J	
Pacific sand lance	A E J	A J	A J	A J
Walleye pollock	A E L	L J	J	J
Atka mackerel			A J	
Pond smelt	A J	A J	A J	A J
Arrowtooth flounder		L	L	
Pacific sandfish			A J	
Pacific cod		L		
Prowfish	A J	A J	A J	A J
Jack mackerel			A J	
Chub mackerel			A J	
Sculpins	A J	A J L	A J	A J
Using The Benthic Areas With No Special Dependence				
Sablefish	A J	A J	A J	A J
Walleye pollock	A E J	A J	A J	A J
Atka mackerel			A E	
Surf smelt	J	J	J	J
Capelin	A J	A E L J	A E L J	A J
Arrowtooth flounder	A J	A J	A J	A J
Pacific halibut	A E J	A J	A J	A J
English sole	A J	A J	A J	A J
Starry flounder	A J	A J	A J	A J
Pacific ocean perch	A J	A J	A J	A J
Flathead sole	A E J	A	A J	A J
Rex sole	A E J	A	A J	A J
Sculpins	A	A	A	A

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MAJOR FINFISH DISTRIBUTION

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Rainbow smelt	A J	A E L* J	A L* J	A J
Longfin smelt		A J*	A J*	A
Eulachon	A J	A J*	A J*	A J
English sole	A* E* L*	L J		
Starry flounder	A* E* L*	L J		
Pink salmon	E* L*	E* L* J*	A E* J*	E* J
Chum salmon	E* L*	E* L* J*	A E* J*	E* J
Coho salmon	A	A J*	A J*	A J
Sockeye salmon		A J*	A J*	
Chinook salmon	A	A J*	A J*	A
Steelhead trout	A	A J*	A J*	A
Dolly Varden	A	J*	A J*	A J
Cutthroat trout	A* J	A J*	A J*	A J
Pacific sandfish	A E* J	J		
King crab		A E L*	A L*	
Tanner crab	J	A E L* J	A L* J	J
Dungeness crab	A J	A E L* J	A L* J	A J
Shrimp	A J	A E L* J	A L* J	A J
Scallops	A J	A E L* J	A L* J	A J
With Dependence on Benthic Areas				
Pacific herring	A* J			A J
Pacific sand lance	A E* J	A J	A J	A J
Pacific cod	A E* J	A J	A J	A J
Lingcod	A E* J	A J	A J	A J
Petrale sole	A* E* L J	A L J	A J	A J
Dover sole	A* E* L J	A L J	A J	A J
King crab	A J	A J	A J	A J
Tanner crab	A J	A J	A J	A J

Speci
Using The shore Area No Special dence
Sablefish
Pacific sa lance
Walleye po
Atka macke
Pond smelt
Arrowtooth flounder
Pacific sa
Pacific co
Prowfish
Jack macke
Chub macke
Sculpins
Using The Areas With Special De dence
Sablefish
Walleye po
Atka macke
Surf smelt
Capelin
Arrowtooth flounder
Pacific ha
English so
Starry flo
Pacific oc perch
Flathead s
Rex sole
Sculpins

Table II.B.2.a.-2
Fish Species Using the Nearshore and Benthic Areas With No Special Dependence, by Season

es	Winter	Spring	Summer	Fall
Near- s With Depen-				
	E L	L	J	
nd				
	A E J	A J	A J	A J
llock	A E L	L J	J	J
rel			A J	
	A J	A J	A J	A J
		L	L	
ndfish			A J	
d		L		
	A J	A J	A J	A J
rel			A J	
rel			A J	
	A J	A J L	A J	A J
Benthic No pen-				
	A J	A J	A J	A J
llock	A E J	A J	A J	A J
rel			A E	
	J	J	J	J
	A J	A E L J	A E L J	A J
	A J	A J	A J	A J
libut	A E J	A J	A J	A J
le	A J	A J	A J	A J
under	A J	A J	A J	A J
ean				
	A J	A J	A J	A J
ole	A E J	A	A J	A J
	A E J	A	A J	A J

For additional information on fisheries, refer to Graphics Nos.4a, 4b, and 5, Commercial Fisheries.

Dungeness crab	A J	A J	A J	A J
Scallops	A J	A J	A J	A J

A = Adults
E = Eggs
L = Larval
J = Juvenile
* = Critical Periods

Source: U.S. Dept. of Commerce, 1978

A = Adul
E = Eggs
L = Larv
J = Juve
* = Crit

Source:

: A A A A
:

ts

al
nile
ical Periods

U.S. Dept. of Commerce, 1978

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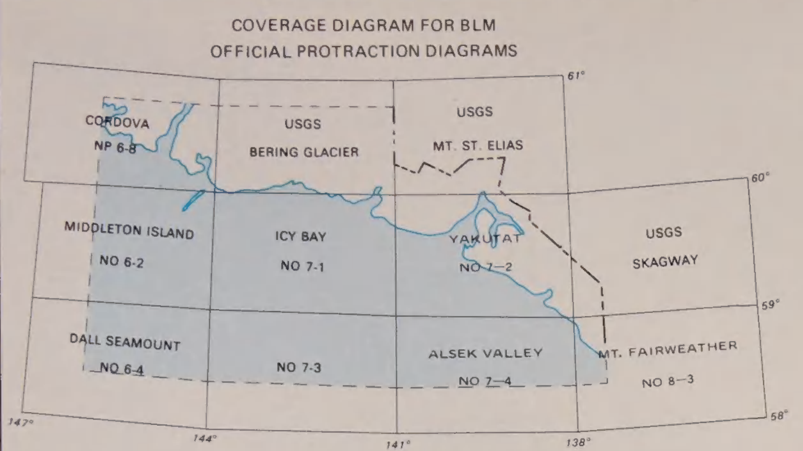
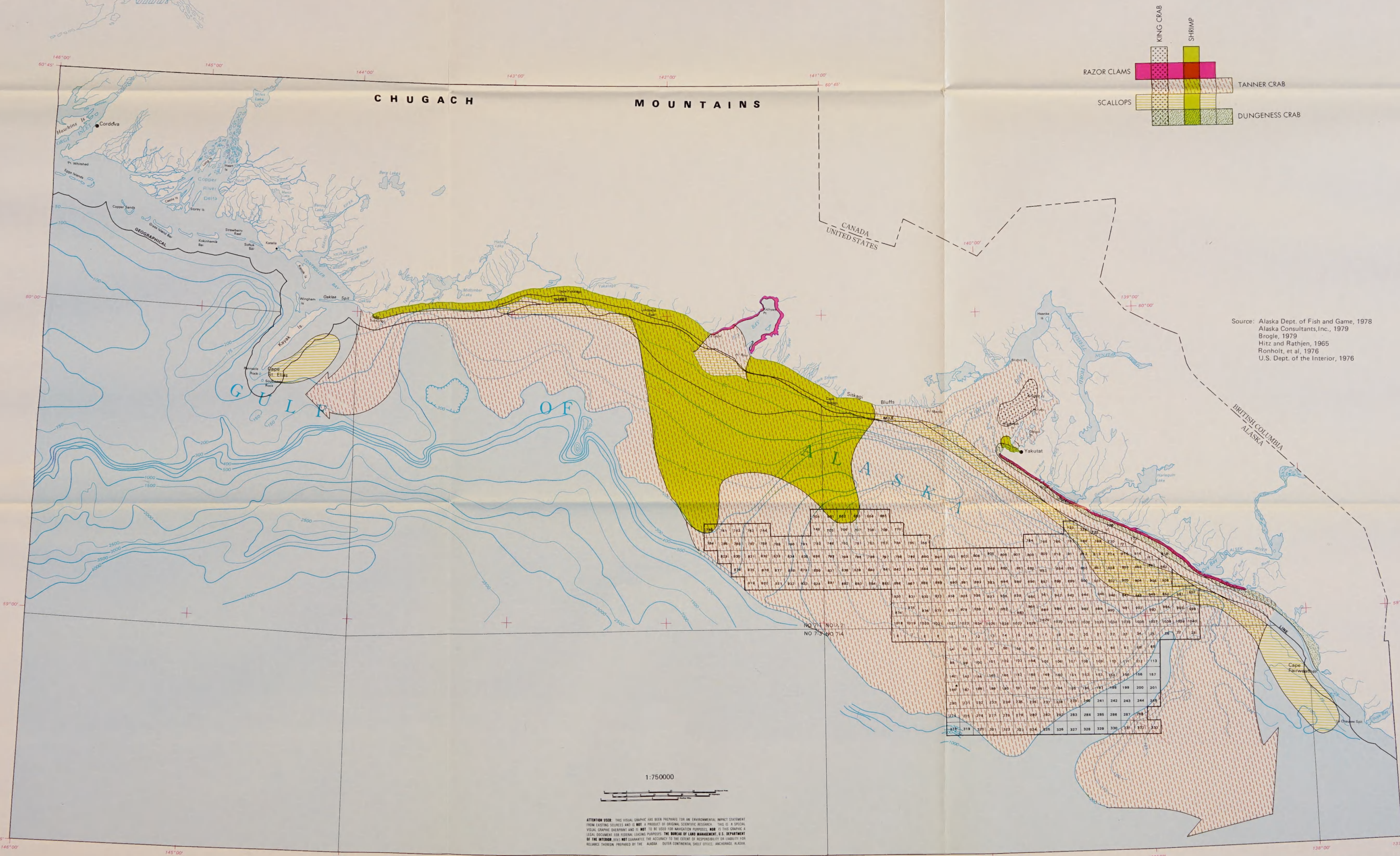
GRAPHIC NO. 4b

MAJOR SHELLFISH DISTRIBUTION

Cape Fairweather To Cape Suckling

Commercial/Sport or
Subsistence Species





Source: Alaska Dept. of Fish and Game, 1978
Alaska Consultants, Inc., 1979
Brogle, 1979
Hitz and Rathjen, 1965
Ronholt, et al, 1976
U.S. Dept. of the Interior, 1976

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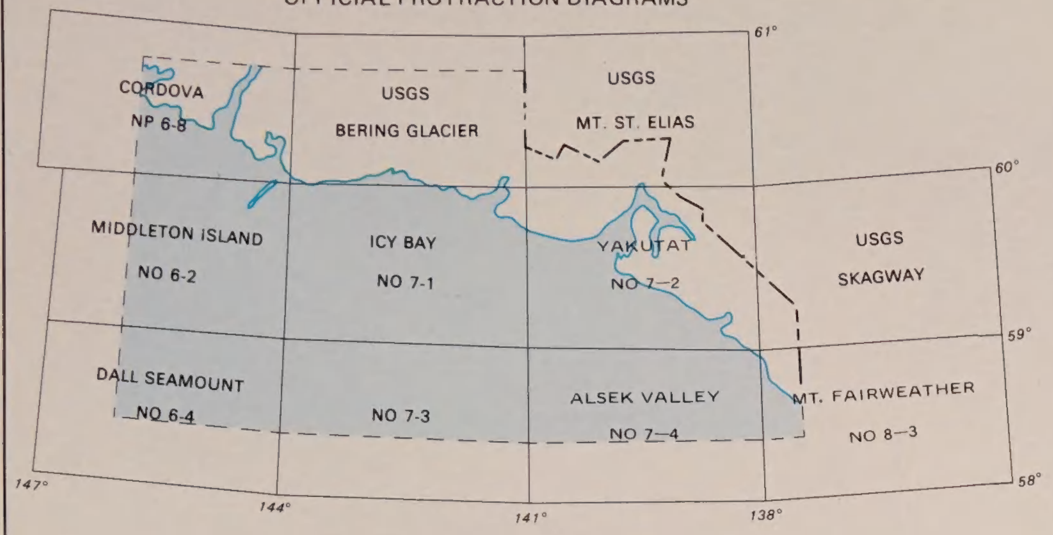
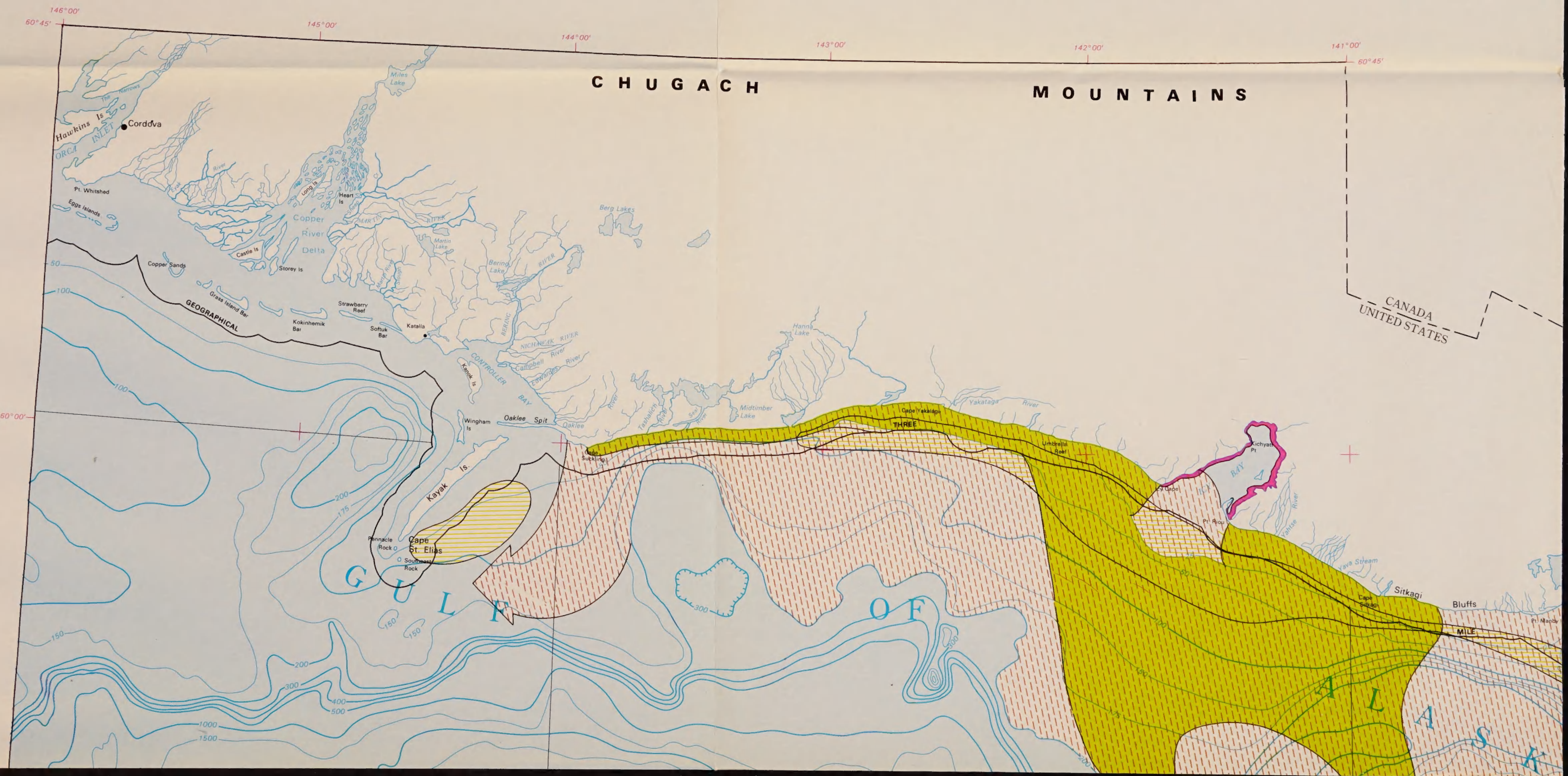
WATER DEPTH IN METERS

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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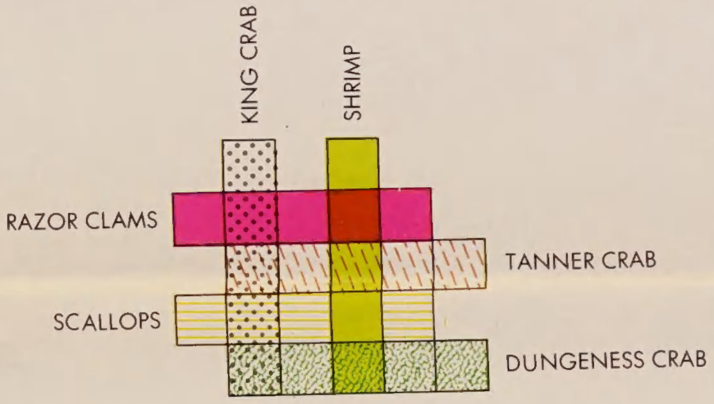
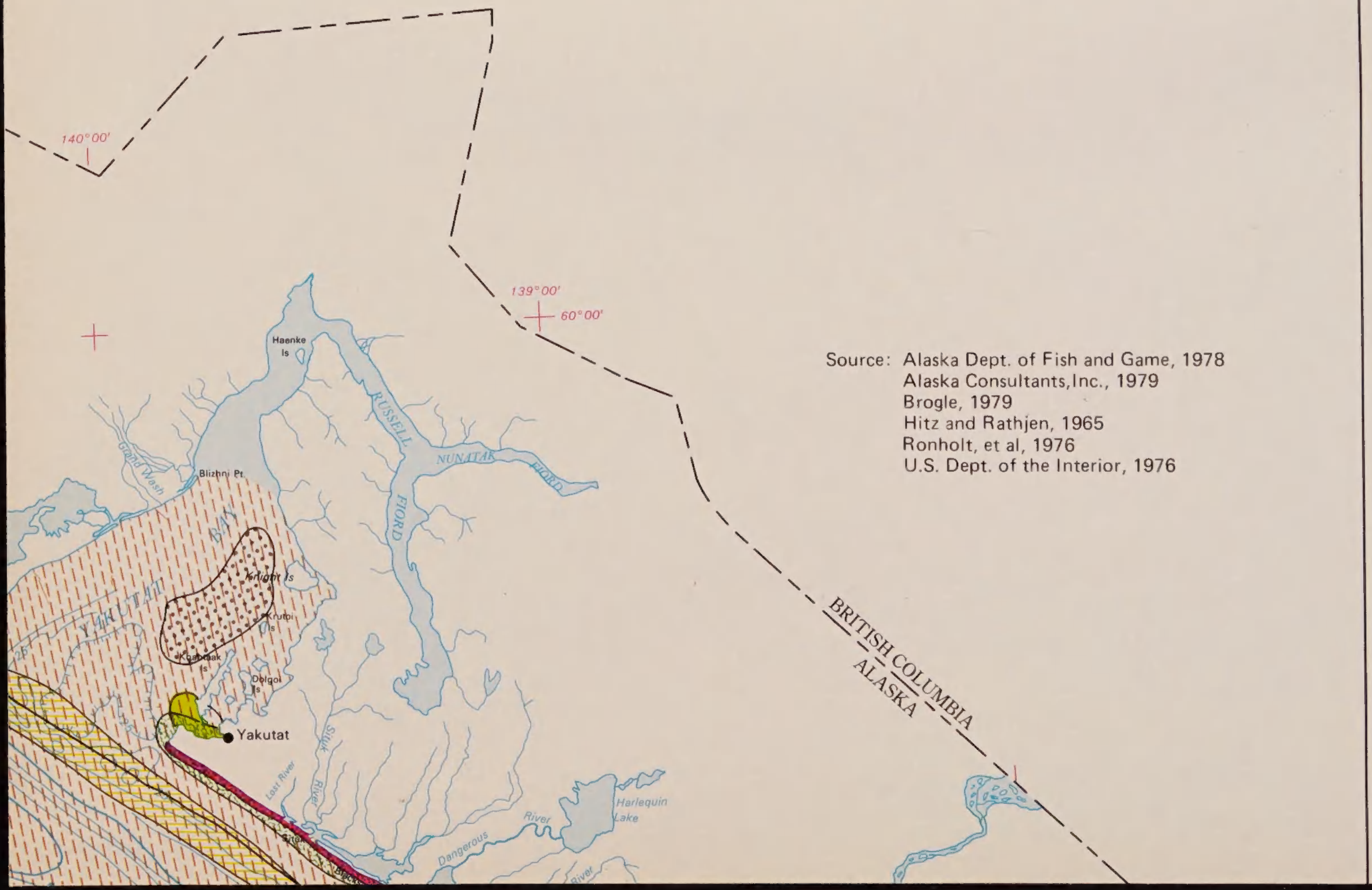
GRAPHIC NO. 4b

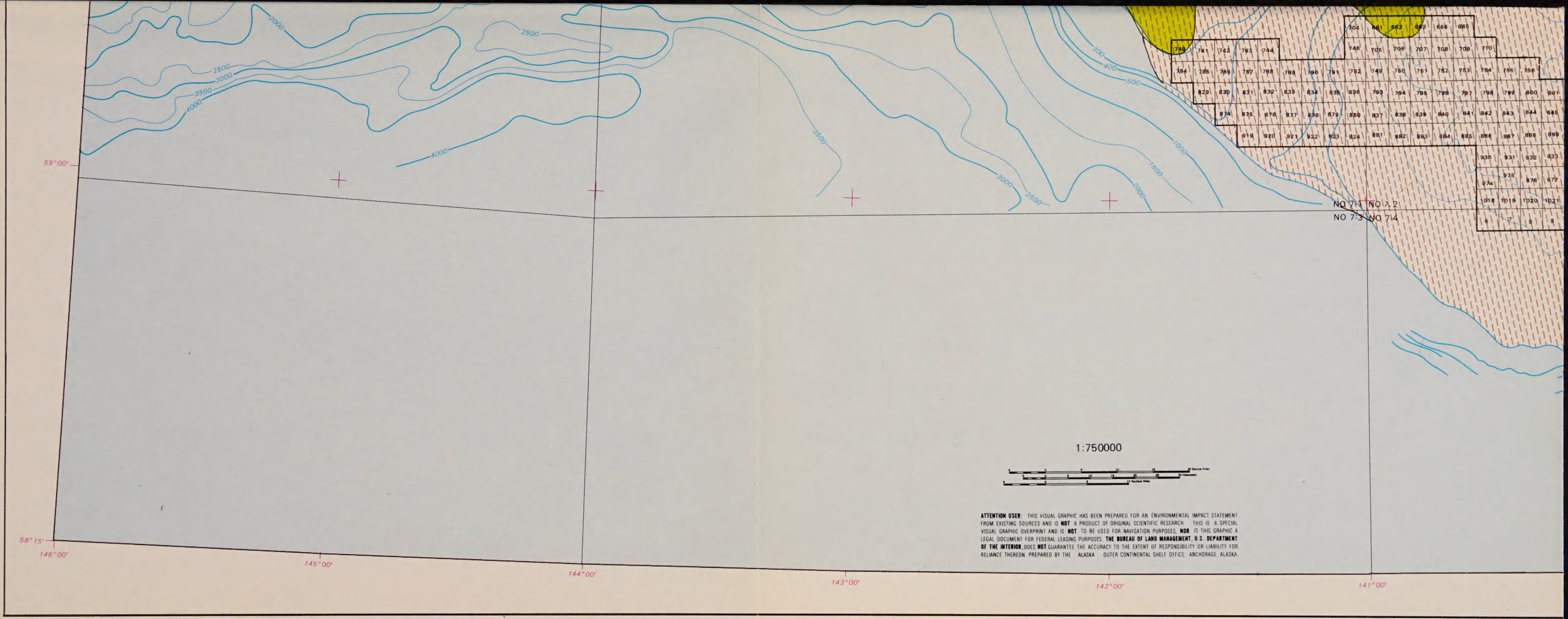
MAJOR SHELLFISH DISTRIBUTION
Cape Fairweather To Cape Suckling

Commercial / Sport or
Subsistence Species





Source: Alaska Dept. of Fish and Game, 1978
Alaska Consultants, Inc., 1979
Brogle, 1979
Hitz and Rathjen, 1965
Ronholt, et al, 1976
U.S. Dept. of the Interior, 1976



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0 5 10 15 20 Statute Miles
0 5 10 15 20 25 30 Kilometers
0 5 10 Nautical Miles

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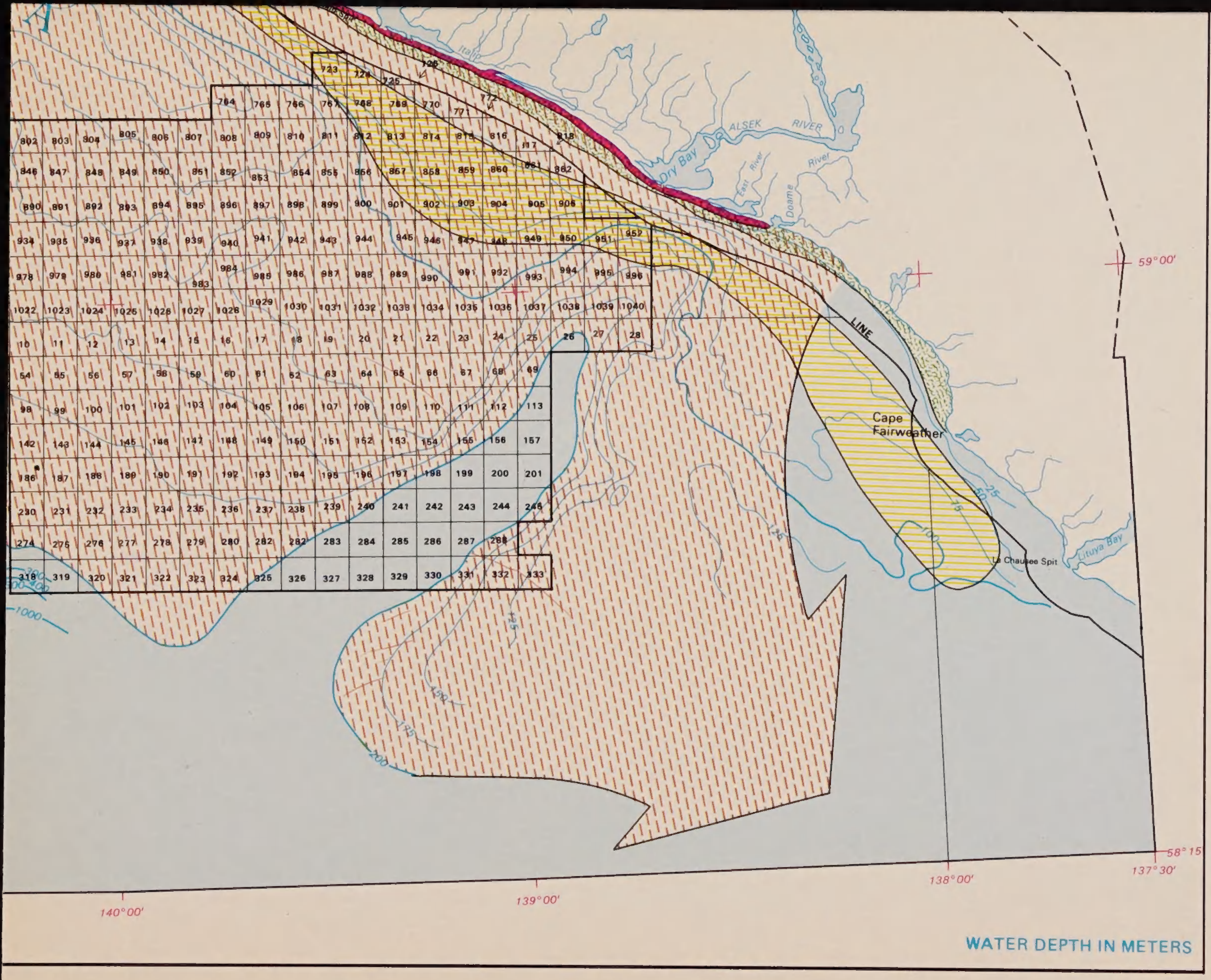
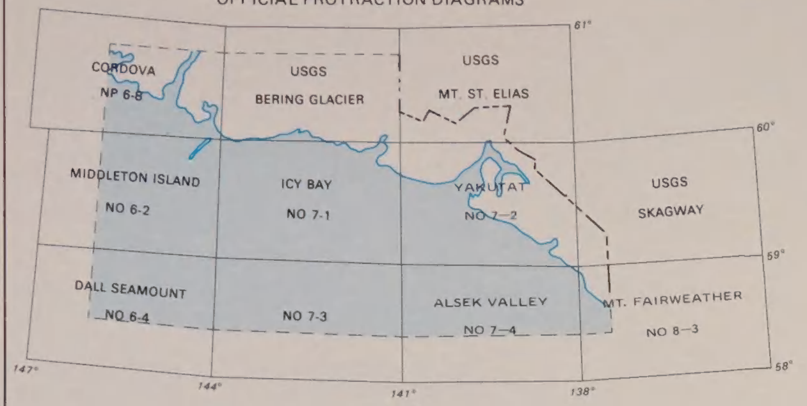
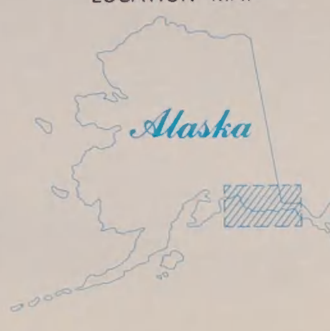

Italio
ALSEK RIVER
Dry Bay
East River
Doame River
LINE
Cape Fairweather
La Chaussee Spit
Lituya Bay
25
50
75
100
125
150
175
200
1000
59° 00'
58° 15'
140° 00'
139° 00'
138° 00'
137° 30'
WATER DEPTH IN METERS

#6139005 ID: 88076077 TD 195.P4 A434 1980 v.2

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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GRAPHIC NO. 5

COMMERCIAL FISHERIES

By Area, Species, and Catch

SALMON FISHERY INSHORE – SET NET

TABLE NO. 1	▩
TABLE NO. 2	▥
TABLE NO. 3	🟥

OFFSHORE – TROLL FISHING

TABLE NO. 4	⁘
TABLE NO. 5	▩
TABLE NO.6	▥

SHELLFISHING, TANNER AND DUNGENESS CRAB –
SCALLOP POTS – OFFSHORE TO NEARSHORE

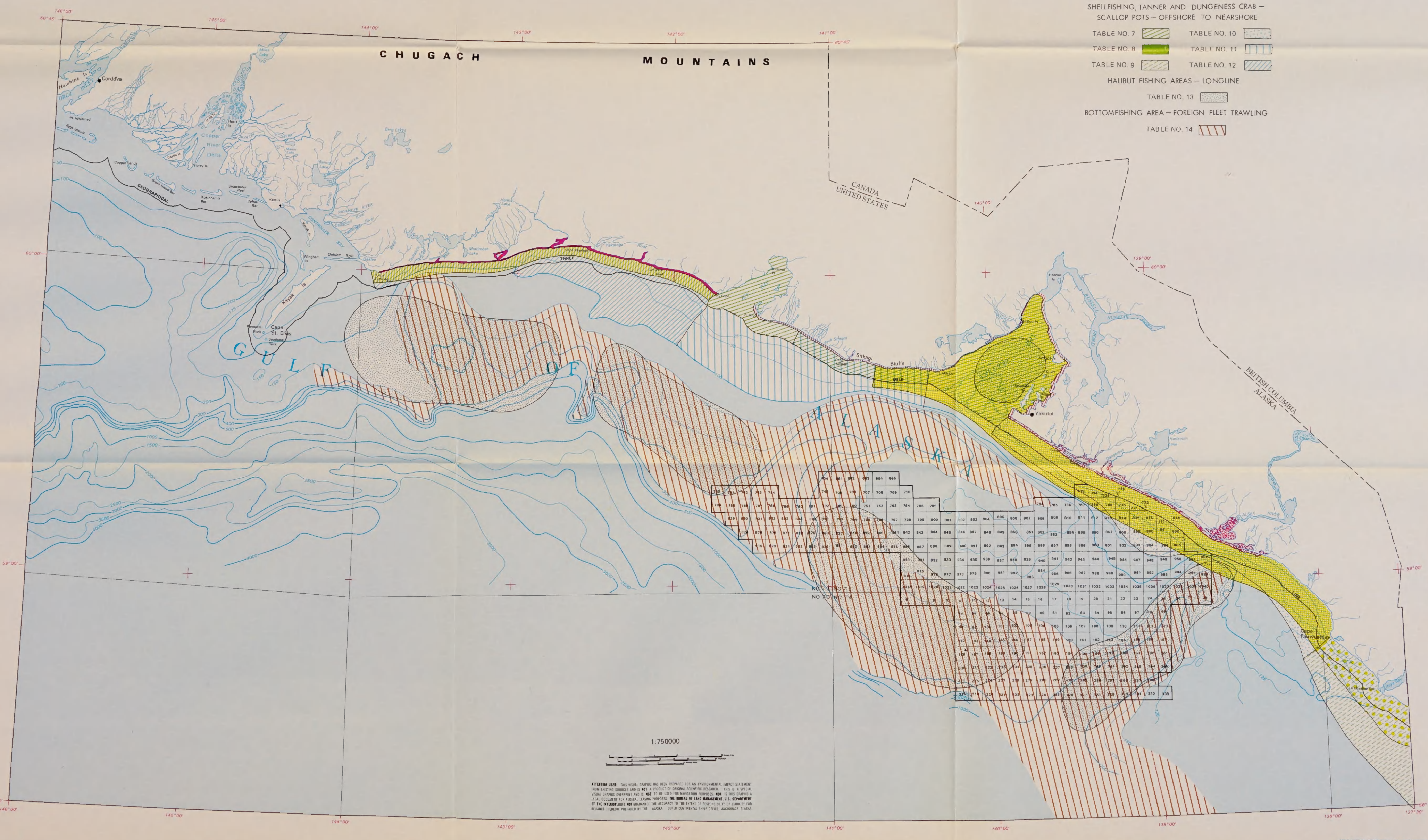
TABLE NO. 7	▨	TABLE NO. 10	⁘
TABLE NO. 8	🟩	TABLE NO. 11	▥
TABLE NO. 9	▨	TABLE NO. 12	▨

HALIBUT FISHING AREAS – LONGLINE

TABLE NO. 13	⁘

BOTTOMFISHING AREA – FOREIGN FLEET TRAWLING

TABLE NO. 14	▧



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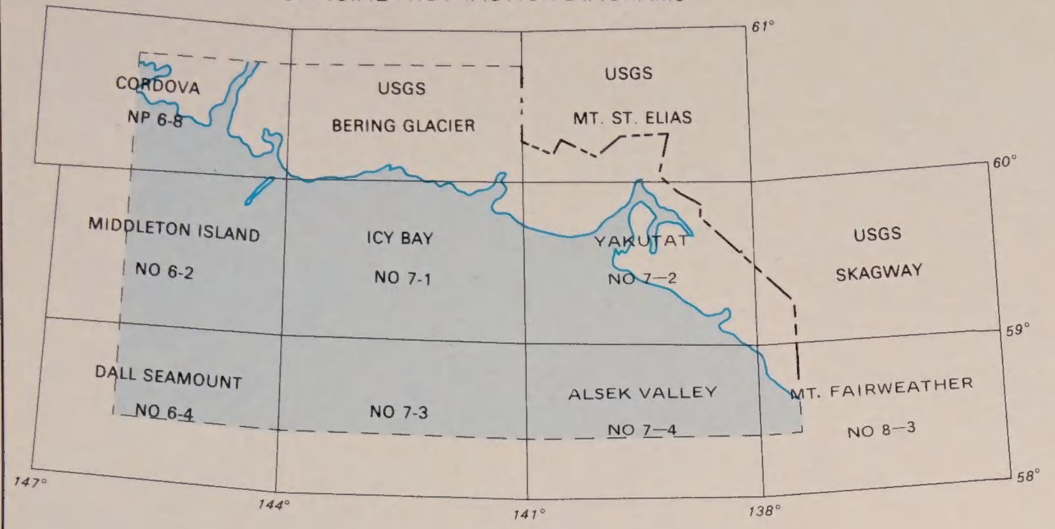
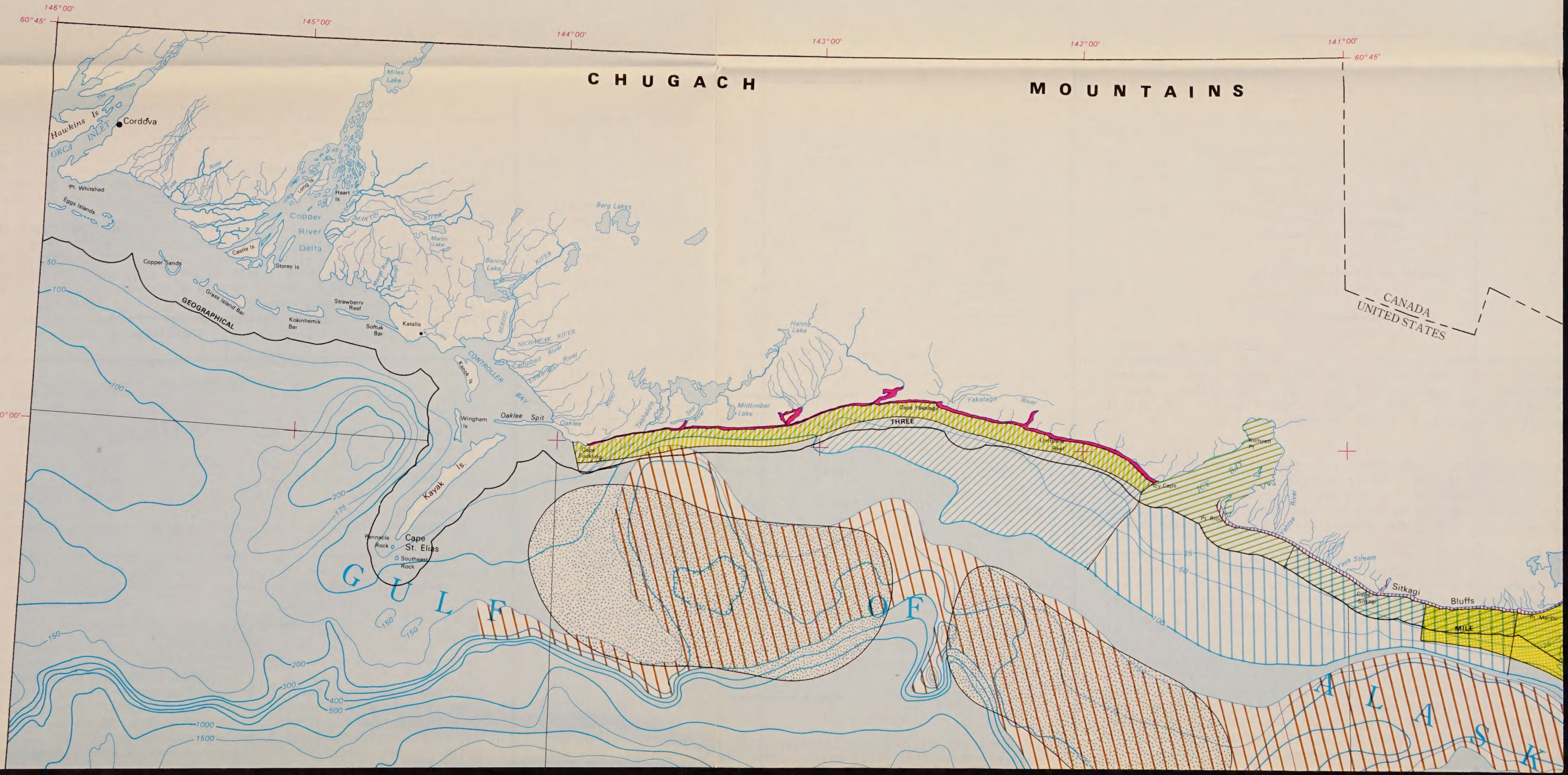
WATER DEPTH IN METERS

COVERAGE DIAGRAM FOR BLM OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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GRAPHIC NO. 5

COMMERCIAL FISHERIES
By Area, Species, and Catch

SALMON FISHERY INSHORE – SET NET

TABLE NO. 1 ▩
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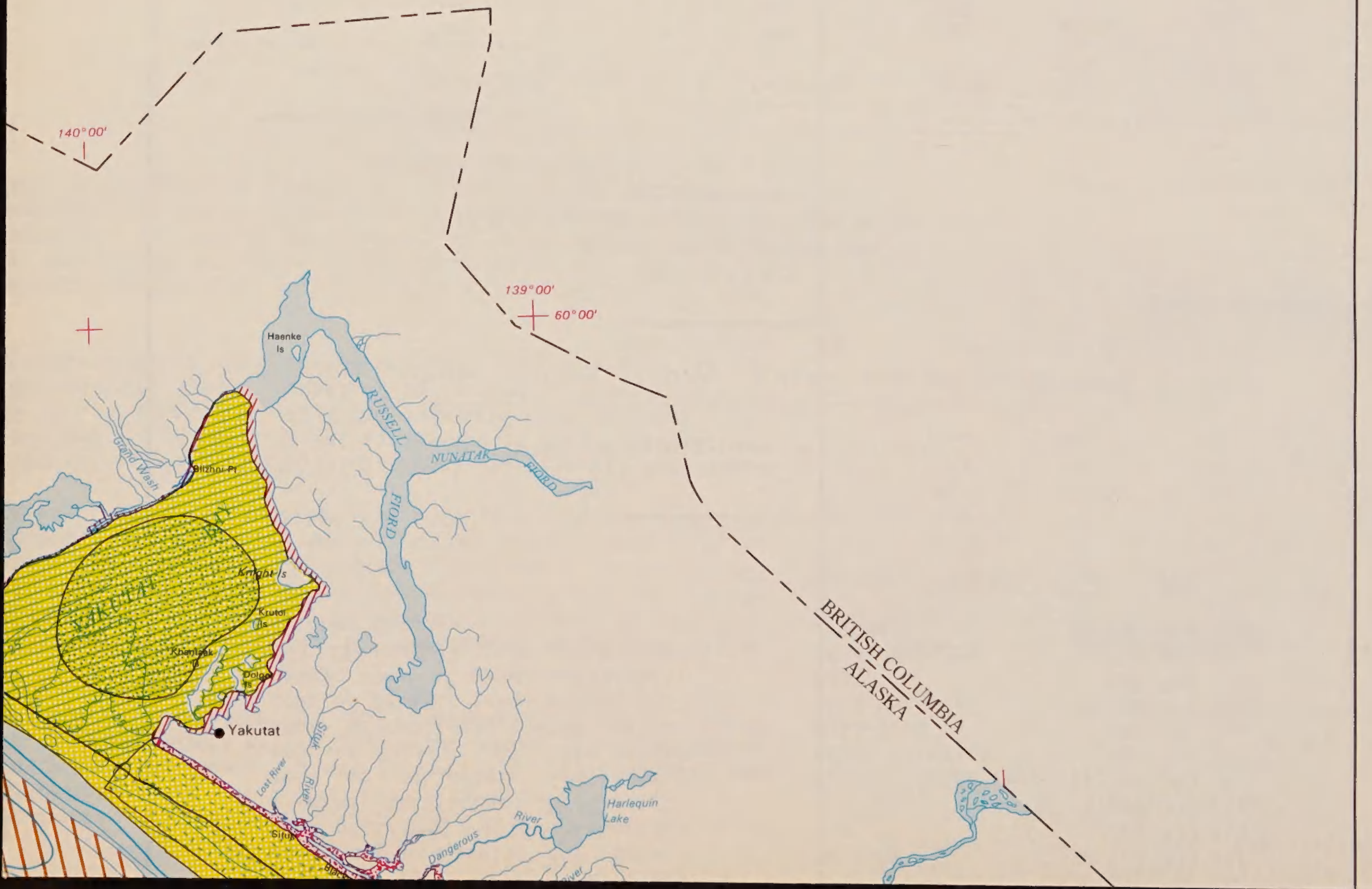
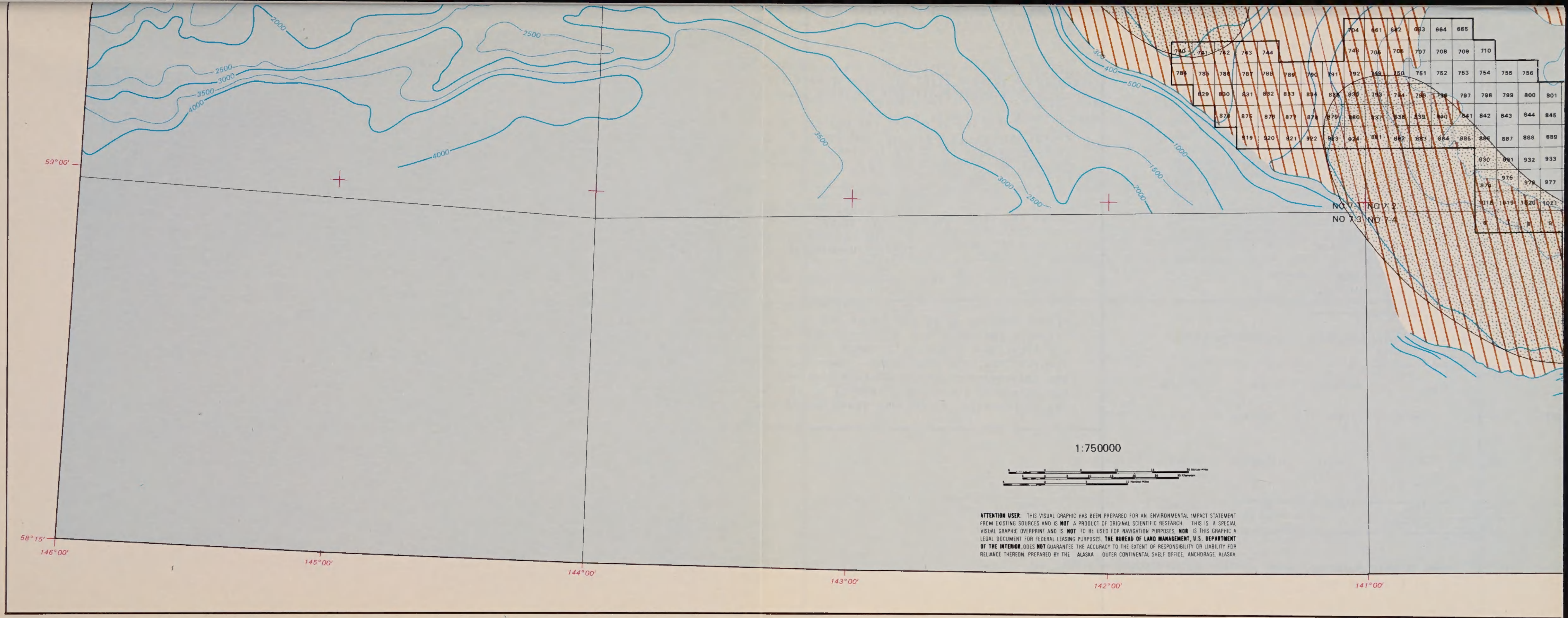
TABLE NO. 14 ▧





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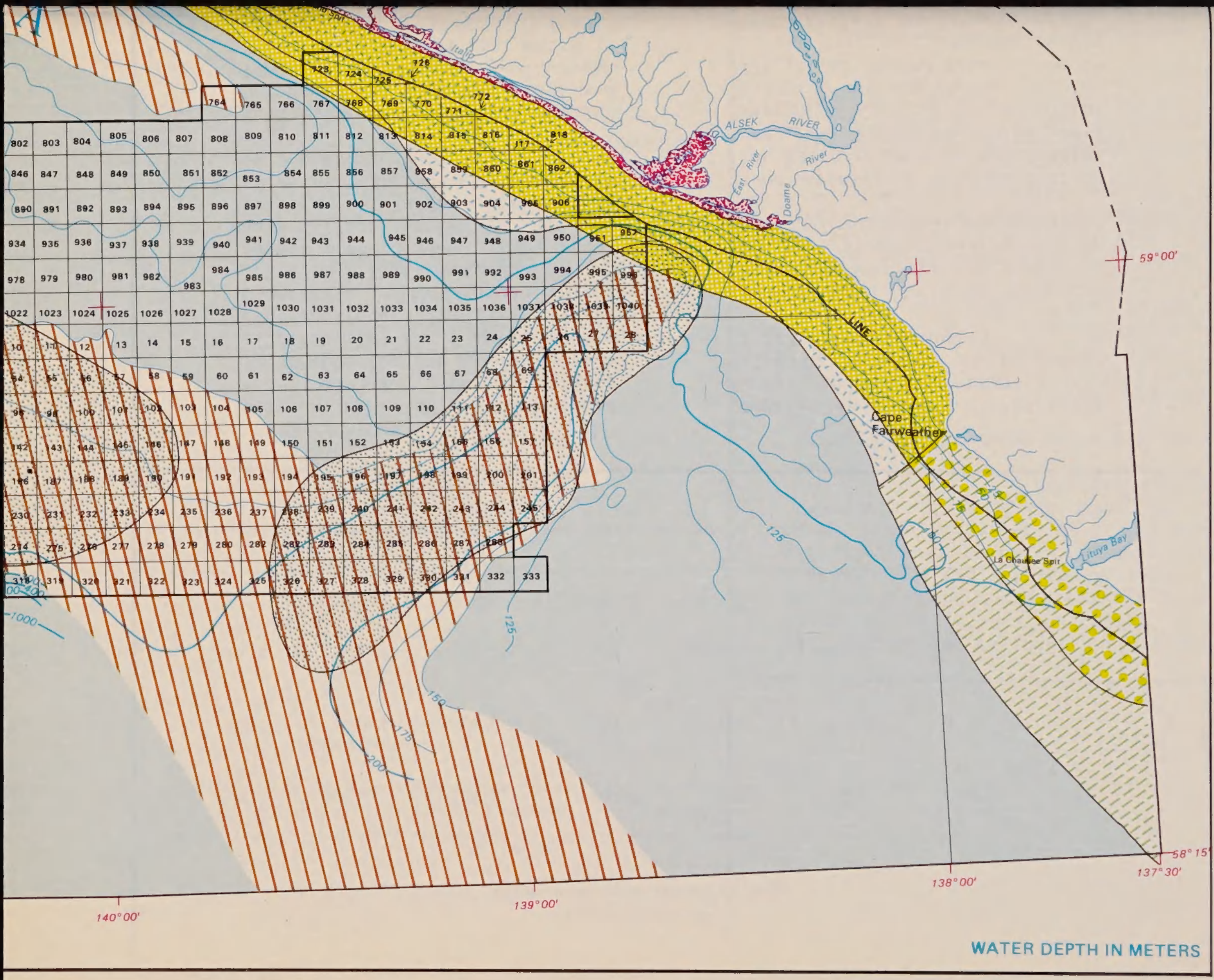

ALSEK RIVER
East River
Doame River
Italio
Cape Fairweather
LINE
La Chaussee Spit
Lituya Bay
59°00'
58°15'
140°00'
139°00'
138°00'
137°30'
125
150
175
200
400
1000
WATER DEPTH IN METERS

GRAPHIC NO. 5

COMMERCIAL FISHERIES

DESCRIPTION OF THE AFFECTED ENVIRONMENT
Description of the Biological Characteristics of the Affected Environment

II.B.2.
Commercial and Sport Fish

Much has been written about the various sport and commercial fish species that inhabit the area affected by this proposal. Some sources of this information are Rosenberg, 1972; Alaska Department of Fish and Game (ADF&G), 1978; the ADF&G Wildlife Notebook Series published at various times between 1968 and 1971; University of Alaska, 1974; the U.S. Department of Commerce, 1977; and the U.S. Department of the Interior, 1976. (See reference section for full title descriptions.)

The following discussion will show those areas and seasons when commercial and sport fish are particularly at risk from petroleum exploration, development, and production activities.

a. Major Fin and Shellfish Distribution: Refer to Graphics Nos. 4a and 4b for additional information.

b. Commercial Fisheries: The inshore areas 182-20 through 182-80 (inclusive) and 183-50, which lie just to the east of Yakutat Bay, have been most productive in terms of commercial salmon catch. The area includes Lost, Situk, Italio, Alsek, and East-Doame Rivers, which are 5 of the 10 most important commercial set net fishing streams in the overall Yakutat fisheries management district. Over the 5-year period of 1973-77, a total of 6,697,400 lbs. (table II.B.2.b.-1) were harvested here for an annual mean of 1,339,480 lbs. Broken down by species, annual means were: Chinook, 47,802; sockeye, 738,978; coho, 431,599; chum, 62,074; and pink, 59,025 lbs. At 1978 Yakutat prices (for gilnetted salmon), which were $1.19 lb. for chinook salmon; $0.95 lb. for sockeye; $0.91 lb. for coho; $0.59 lb. for chum; and $0.36 lb. for pinks; annual mean total value is $1,209,541. Broken down by species, annual mean values are for chinook, $56,884; sockeye, $702,029; coho, $392,755; chum, $36,624; and Pinks, $21,249.

Table II.B.2.b.-1
Inshore Salmon Fishery In Periods Caught

Species	Year 1973	1974	1975	1976	1977
Chinook	53,020	52,014	52,489	39,201	44,288
Sockeye	809,229	533,872	425,966	808,336	1,117,487
Coho	218,640	345,961	292,693	346,196	760,504
Chum	80,530	39,354	31,989	74,234	84,262
Pink	53,668	18,467	34,362	40,084	148,544
Total	1,215,087	1,189,668	837,499	1,302,061	2,153,085

Source: Alaska Dept. of Fish and Game Statistical Records.

Yakutat Bay subarea management units (fig. II.B.2.b.-1) 183-10 and its immediate environs, subarea 183-40 (Humpy Creek) to the east and 183-20 (Manby Shore) and 185-0 (Yahtse River) to the west have produced 1,298,762 pounds (table II.B.2.b.-2) of salmon over the 5-year period from 1973 through 1977. This amounts to an annual mean of 259,752 lbs. Broken down by species, yearly averages were for chinook, 6,768 lbs.; sockeye, 73,540 lbs.; coho, 72,795 lbs.; chum, 4,812 lbs.; and pinks, 107,252 lbs. respectively.

Average yearly value (figured at 1978 Yakutat gillnet prices) can be computed as $8,054 for chinook; $69,836 for sockeye; $66,243 for coho; $2,839 for chum; and $38,611 for pinks. Average annual total value for all species is $185,583.

Table II.B.2.b.-2
Inshore Salmon Fishery In Pounds Caught

Species	Year 1973	1974	1975	1976	1977
Chinook	1,777	1,662	859	1,371	1,099
Sockeye	68,969	33,506	32,789	66,229	166,208
Coho	59,342	86,755	65,536	13,974	138,366
Chum	20,483	2,318	122	407	729
Pink	12,707	2,151	262,578	75,414	183,411
Total	121,178	68,985	361,884	157,395	463,644

Source: Alaska Dept. of Fish and Game Statistical Records.

Along the coast to the west of Yakutat Bay (fig. II.B.2.b.-1) subareas 192-30 (Yakataga River), 192-41 (Kaliakh River), 192-42 (Tsivat-Tsui Rivers), and 192-60 (Kiklukh River) produced 295,282 lbs. (table II.B.2.b.-3) of coho salmon over the 5-year period from 1973 through 1977. This amounted to an annual mean of 59,056 lbs. and, at the 1978 price of $0.91 a lb., had a yearly value of $53,741 to the fishermen.

Table II.B.2.b.-3
Inshore Salmon Fishery In Pounds Caught

Species	Year 1973	1974	1975	1976	1977
Chinook					
Sockeye					
Coho	87,231	88,105		45,251	74,695
Chum					
Pink					
Total	87,231	88,105		45,251	74,695

Source: Alaska Dept. of Fish and Game Statistical Records.

The importance of offshore salmon troll fishing is reflected in the following. In troll area 116-00 (table II.B.2.b.-4) (subdistricts 116-11 through 116-50, inclusive) average annual catches over the 5-year period 1973 through 1977 were: Kings, 120,313 lbs.; silvers, 307,888 lbs.; pinks, 13,240 lbs.; chum, 2,215 lbs.; and reds, 552 lbs. At 1978 troll-caught prices ($1.57 lb. for kings and silvers; $0.42 lb. for pinks; $0.57 lb. for chum; and $0.90 lb. for reds), average annual value to fishermen is $680,000.

Offshore troll fishing has been conducted also in troll areas:

181-00 (including 181-10 through 181-90)
183-00 (including 183-60 and 183-70)
184-00 (including 184-10, 184-20, and 184-30)
186-00 (including 186-20 and 186-30) and
191-00 (including 191-10, 191-20, and 191-30).

However, none of these areas have been as productive as 116-00. Most productive has been 183-00 (table II.B.2.b.-5) with an average annual value of $44,000 to fishermen followed by 181-00 (table II.B.2.b.-6) with a value of $17,000 and 191-00 at $15,000.

Recently, fishermen have moved trolling operations farther offshore outside 12 miles into troll area 189-00. In 1977, a total of 31,651 lbs. of king salmon were caught in this area with a value of nearly $50,000.

Also, over the long term, the most productive offshore troll area has been 157-00 which lies 12 miles offshore between Lituya Bay and Column Pt. to the east and south of the lease sale area. Catches from this area were off precipitously, however, in the years of 1975-77.

Table II.B.2.b.-4
Offshore Salmon Troll Fishery in Pounds--Area 116-00

Species	Year 1973	1974	1975	1976	1977
Chinook	254,913	208,969	23,813	40,622	81,246
Sockeye	648	554	--	85	1,473
Coho	453,791	688,713	7,323	145,822	243,788
Chum	3,768	3,409	187	307	2,953
Pink	17,926	19,418	540	4,114	24,201
Total	731,046	913,063	31,863	190,950	353,661

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-5
Offshore Salmon Troll Fishery in Pounds--Area 183-00

Species	Year 1973	1974	1975	1976	1977
Chinook	16,871	23,055	31,582	20,568	24,480
Sockeye	--	--	311	--	13
Coho	6,039	2,483	1,099	2,016	9,918
Chum	--	--	10	10	14
Pink	168	157	90	36	129
Total	23,089	25,695	33,092	22,630	34,554

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-6
Offshore Salmon Troll Fishery in Pounds--Area 181-00

Species	Year 1973	1974	1975	1976	1977
Chinook	3,216	19,800	1,464	--	1,644
Sockeye	3	--	--	--	--
Coho	645	1,111	42	--	27,549
Chum	5	429	17	--	5
Pink	95	40	5	--	7
Total	3,964	21,380	1,528	--	29,205

Source: Alaska Dept. of Fish and Game Statistical Records.

Heavy inshore catches of shellfish over the 5-year period of 1973-77 were in Yakutat Bay and its immediate environs (statistical subunits 183-10, 183-20, 183-40, and 185-10) (table II.B.2.b.-7) and also Icy Bay (subunit 186-10) (table II.B.2.b.-8). In Yakutat Bay and nearby waters, annual mean catches were for (a) dungeness crab, 42,000 lbs.; (b) tanner crab, 237,000 lbs.; and (c) weathervane scallops, 5,100. At 1978 prices (dungeness, $0.70 lb.; tanner, $0.28 lb.; and scallops, $3.00 lb.), annual values are $29,000, $66,000, and $15,000 (rounded values), respectively. Average annual Icy Bay catches were (a) dungeness crab, 388,000 lbs.; (b) tanner crab, 295,000 lbs.; and (c) weathervane scallops, 4,900 lbs. Average annual values are $270,000, $82,000, and $15,000 for these fisheries.

The only other shellfish catches in inshore subdistricts were harvested some distance to the east and south of Yakutat Bay in subdistricts 116-11, 116-12, and 116-13. Average annual catches (for the same 5-year period) were (a) dungeness crab, 44,000 lbs. and (b) tanner crab, 10,900 lbs. Fisheries are worth $31,000 and $3,000 annually to fishermen.

Table II.B.2.b.-7
Inshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	107,665	35,361	28,316	37,652	2,192
Tanner Crab	86,718	292,603	139,640	165,000	501,807
Scallops	--	25,522			

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-8
Inshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	652,750	514,631	283,187	369,380	121,630
Tanner Crab	104,623	185,416	136,552	704,696	346,151
Scallops	--	--	13,391	9,205	1,974

Source: Alaska Dept. of Fish and Game Statistical Records.

Shellfish were taken offshore from Yakutat Bay in a wide range from east to west. Just east of the lease area in subdistricts 116-14 and 116-20 (table II.B.2.b.-9) average annual catches were (a) for dungeness crab, 49,000 lbs. and (b) for tanner crab, 41,000 lbs. Annual values to fishermen are for dungeness, $34,000 and for tanner, $11,000.

In offshore areas immediately to the east of Yakutat Bay (table II.B.2.b.-10) subdistricts 181-10, 181-20, 181-30, 181-60, 181-70, 183-60, and 183-70, the average annual catch of dungeness crab was 274,000 lbs.; tanner crab, 525,000 lbs.; and weathervane scallops, 137,000 lbs. Annual values to the fishermen are for dungeness, $192,000; tanner, $147,000; and scallops, $411,000, respectively.

Areas directly offshore from Yakutat Bay (table II.B.2.b-11) and to the immediate west (subdistricts 184-10, 184-20, and 186-20) yielded annual average harvests of 138,000 lbs. of dungeness, 262,000 lbs. of tanner, and 2,400 lbs. of scallops. Annual values to fishermen are (a) dungeness, $97,000; (b) tanner crab, $73,000; and (c) scallops, $7,000.

West of Icy Bay and offshore (table II.B.2.b.-12) subdistricts 191-10 and 191-20 produced annual means of 82,000 lbs. of dungeness; 114,000 lbs. of tanner; and 9,800 lbs. of weathervane scallops. Average annual value of these fisheries to fishermen can be computed (at 1978 prices) as $57,000 for dungeness; $32,000 for tanner; and $29,000 for scallops.

Table II.B.2.b-9
Offshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	143,650	44,982	23,171	33,393	--
Tanner Crab	207,379	--	--	--	--

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-10
Offshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	950,791	182,810	166,781	67,251	--
Tanner Crab	2,856	1,254,382	1,135,123	239,847	--
Scallops	135,261	264,306	98,913	168,432	20,147

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-11
Offshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	306,540	237,660	81,714	63,260	--
Tanner Crab	12,751	548,465	118,657	464,629	167,784
Scallops	--	--	--	11,966	--

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-12
Offshore Shellfish Catches in Pounds

Species	Year 1973	1974	1975	1976	1977
Dungeness Crab	329,661	61,457	19,910	--	--
Tanner Crab	--	--	428,043	140,020	--
Scallops	38,439	--	10,549	--	--

Source: Alaska Dept. of Fish and Game Statistical Records.

Between 1973 and 1977, American and Canadian fishermen caught 17,321,000 lbs. of halibut (table II.B.2.b.-13) in Yakutat waters (International Pacific Halibut Commission Statistical Areas 18W-23). This amounted to an annual mean of about three and a half million pounds. At the 1978 price of $1.24/lb., annual mean value of fishery to fishermen is $4.3 million.

During the 5-year period of 1969 through 1974, Japanese trawl and longline vessels caught 358,890,400 lbs. of bottomfish in waters off Yakutat (table II.B.2.b.-14). Yearly averages were approximately 849 metric tons of turbot; 1318 metric tons of other flatfishes; 10281 metric tons of sablefish; 179 metric tons of Pacific cod; 1244 metric tons of pollock; 16576 metric tons of Pacific ocean perch; 1281 metric tons of other rockfishes; and 898 metric tons of miscellaneous fishes.

Computed in terms of 1979 world market prices, average yearly value to fishermen is in excess of $23 million annually.

Records from the same area for Soviet catches are not complete, but we assume their catch is about 1/4 of the Japanese catch.

Based mainly on foreign bottomfish catch records in the Yakutat area, the North Pacific Fishery Management Council projected the following optimum yields (OY) for 1978 (to be shared between domestic and foreign fishermen as per NPFMC fishery management plan).

Pollock	27,500,000 lbs.
Cod	9,460,000 lbs.
Flounder	14,080,000 lbs.
Pacific Ocean Perch	17,380,000 lbs.
Other Rockfish	7,480,000 lbs.
Sablefish	7,480,000 lbs.
Atka Mackerel	2,200,000 lbs.
Squid	880,000 lbs.
Other Species	4,620,000 lbs.
TOTAL	91,080,000 lbs.

Source: NPFMC Plan, 1978.

Table II.B.2.b.-13
Catch IPHC Statistical Area 18W-23 in Pounds

Species	1973	1974	1975	1976	1977
Halibut	3,575,000	2,735,000	4,105,000	4,272,000	2,634,000

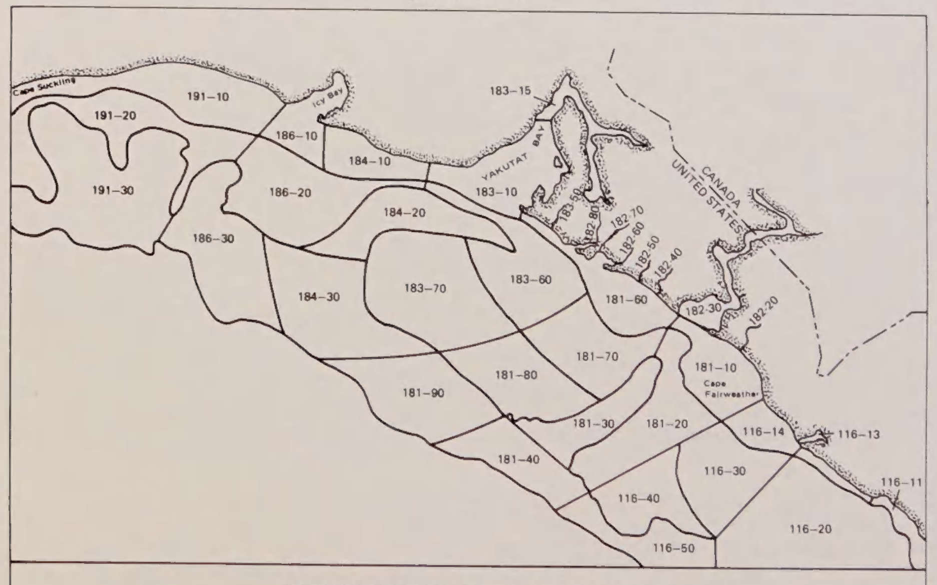
Table II.B.2.b.-14
Total Japanese Trawl and Longline Catch [1/]
By Species or Species Group and Region in the Study Area
1969-74 (Metric Tons)

Species or Species Group	Region Fairweather	Yakutat
Turbot	1383	2864
Other Flatfishes	2853	3735
Sablefish	31185	20222
Pacific Cod	156	740
Pollock	1573	4649
Pacific Ocean Perch	31649	51232
Other Rockfishes	3198	3205
Miscellaneous Fishes	2053	2435
TOTAL	74050	89082

1/ Round weight

Source: U.S. Dept. Commerce, 1978 (Ronholt, et al.)

Figure II.B.2.b.-1.



YAKUTAT AND OFFSHORE FISHERY MANAGEMENT UNITS

Source: Alaska Dept. of Fish and Game, 1978

GRAPHIC NO. 5

COMMERCIAL FISHERIES

DESCRIPTION OF THE AFFECTED ENVIRONMENT
Description of the Biological Characteristics of the Affected Environment

II.B.2.
Commercial and Sport Fish

Much has been written about the various sport and commercial fish species that inhabit the area affected by this proposal. Some sources of this information are Rosenberg, 1972; Alaska Department of Fish and Game (ADF&G), 1978; the ADF&G Wildlife Notebook Series published at various times between 1968 and 1971; University of Alaska, 1974; the U.S. Department of Commerce, 1977; and the U.S. Department of the Interior, 1976. (See reference section for full title descriptions.)

The following discussion will show those areas and seasons when commercial and sport fish are particularly at risk from petroleum exploration, development, and production activities.

a. Major Fin and Shellfish Distribution: Refer to Graphics Nos. 4a and 4b for additional information.

b. Commercial Fisheries: The inshore areas 182-20 through 182-80 (inclusive) and 183-50, which lie just to the east of Yakutat Bay, have been most productive in terms of commercial salmon catch. The area includes Lost, Situk, Italio, Alsek, and East-Doame Rivers, which are 5 of the 10 most important commercial set net fishing streams in the overall Yakutat fisheries management district. Over the 5-year period of 1973-77, a total of 6,697,400 lbs. (table II.B.2.b.-1) were harvested here for an annual mean of 1,339,480 lbs. Broken down by species, annual means were: Chinook, 47,802; sockeye, 738,978; coho, 431,599; chum, 62,074; and pink, 59,025 lbs. At 1978 Yakutat prices (for gilnetted salmon), which were $1.19 lb. for chinook salmon; $0.95 lb. for sockeye; $0.91 lb. for coho; $0.59 lb. for chum; and $0.36 lb. for pinks; annual mean total value is $1,209,541. Broken down by species, annual mean values are for chinook, $56,884; sockeye, $702,029; coho, $392,755; chum, $36,624; and Pinks, $21,249.

Table II.B.2.b.-1
Inshore Salmon Fishery In Periods Caught

	Year				
Species	1973	1974	1975	1976	1977
Chinook	53,020	52,014	52,489	39,201	44,288
Sockeye	809,229	533,872	425,966	808,336	1,117,487
Coho	218,640	345,961	292,693	346,196	760,504
Chum	80,530	39,354	31,989	74,234	84,262
Pink	53,668	18,467	34,362	40,084	148,544
Total	1,215,087	1,189,668	837,499	1,302,061	2,153,085

Source: Alaska Dept. of Fish and Game Statistical Records.

Yakutat Bay subarea management units (fig. II.B.2.b.-1) 183-10 and its immediate environs, subarea 183-40 (Humpy Creek) to the east and 183-20 (Manby Shore) and 185-0 (Yahtse River) to the west have produced 1,298,762 pounds (table II.B.2.b.-2) of salmon over the 5-year period from 1973 through 1977. This amounts to an annual mean of 259,752 lbs. Broken down by species, yearly averages were for chinook, 6,768 lbs.; sockeye, 73,540 lbs.; coho, 72,795 lbs.; chum, 4,812 lbs.; and pinks, 107,252 lbs. respectively.

Average yearly value (figured at 1978 Yakutat gillnet prices) can be computed as $8,054 for chinook; $69,836 for sockeye; $66,243 for coho; $2,839 for chum; and $38,611 for pinks. Average annual total value for all species is $185,583.

Table II.B.2.b.-2
Inshore Salmon Fishery In Pounds Caught

The importance of offshore salmon troll fishing is reflected in the following. In troll area 116-00 (table II.B.2.b.-4) (subdistricts 116-11 through 116-50, inclusive) average annual catches over the 5-year period 1973 through 1977 were: Kings, 120,313 lbs.; silvers, 307,888 lbs.; pinks, 13,240 lbs.; chum, 2,215 lbs.; and reds, 552 lbs. At 1978 troll-caught prices ($1.57 lb. for kings and silvers; $0.42 lb. for pinks; $0.57 lb. for chum; and $0.90 lb. for reds), average annual value to fishermen is $680,000.

Offshore troll fishing has been conducted also in troll areas:

181-00 (including 181-10 through 181-90)
183-00 (including 183-60 and 183-70)
184-00 (including 184-10, 184-20, and 184-30)
186-00 (including 186-20 and 186-30) and
191-00 (including 191-10, 191-20, and 191-30).

However, none of these areas have been as productive as 116-00. Most productive has been 183-00 (table II.B.2.b.-5) with an average annual value of $44,000 to fishermen followed by 181-00 (table II.B.2.b.-6) with a value of $17,000 and 191-00 at $15,000.

Recently, fishermen have moved trolling operations farther offshore outside 12 miles into troll area 189-00. In 1977, a total of 31,651 lbs. of king salmon were caught in this area with a value of nearly $50,000.

Also, over the long term, the most productive offshore troll area has been 157-00 which lies 12 miles offshore between Lituya Bay and Column Pt. to the east and south of the lease sale area. Catches from this area were off precipitously, however, in the years of 1975-77.

Table II.B.2.b.-4
Offshore Salmon Troll Fishery in Pounds--Area 116-00

	Year				
Species	1973	1974	1975	1976	1977
Chinook	254,913	208,969	23,813	40,622	81,246
Sockeye	648	554	--	85	1,473
Coho	453,791	688,713	7,323	145,822	243,788
Chum	3,768	3,409	187	307	2,953
Pink	17,926	19,418	540	4,114	24,201
Total	731,046	913,063	31,863	190,950	353,661

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-5
Offshore Salmon Troll Fishery in Pounds--Area 183-00

	Year				
Species	1973	1974	1975	1976	1977
Chinook	16,871	23,055	31,582	20,568	24,480
Sockeye	--	--	311	--	13
Coho	6,039	2,483	1,099	2,016	9,918
Chum	--	--	10	10	14
Pink	168	157	90	36	129
Total	23,089	25,695	33,092	22,630	34,554

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-7
Inshore Shellfish Catches in Pounds

	Year				
Species	1973	1974	1975	1976	
Dungeness Crab	107,665	35,361	28,316	37,652	2
Tanner Crab	86,718	292,603	139,640	165,000	501
Scallops	--	25,522			

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-8
Inshore Shellfish Catches in Pounds

	Year				
Species	1973	1974	1975	1976	
Dungeness Crab	652,750	514,631	283,187	369,380	121
Tanner Crab	104,623	185,416	136,552	704,696	346
Scallops	--	--	13,391	9,205	1

Source: Alaska Dept. of Fish and Game Statistical Records.

Shellfish were taken offshore from Yakutat Bay in a wide ran
east to west. Just east of the lease area in subdistricts
and 116-20 (table II.B.2.b.-9) average annual catches were
dungeness crab, 49,000 lbs. and (b) for tanner crab, 41,0
Annual values to fishermen are for dungeness, $34,000
tanner, $11,000.

In offshore areas immediately to the east of Yakutat Bay
II.B.2.b.-10) subdistricts 181-10, 181-20, 181-30, 181-60,
183-60, and 183-70, the average annual catch of dungeness
274,000 lbs.; tanner crab, 525,000 lbs.; and weathervane sc
137,000 lbs. Annual values to the fishermen are for dun
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Areas directly offshore from Yakutat Bay (table II.B.2.b-11)
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are (a) dungeness, $97,000; (b) tanner crab, $73,000; and (c
lops, $7,000.

West of Icy Bay and offshore (table II.B.2.b.-12) subdi
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geness; 114,000 lbs. of tanner; and 9,800 lbs. of weat
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be computed (at 1978 prices) as $57,000 for dungeness; $32,
tanner; and $29,000 for scallops.

Table II.B.2.b-9
Offshore Shellfish Catches in Pounds

	Year			
Species	1973	1974	1975	1976
Dungeness Crab	143,650	44,982	23,171	33,393
Tanner Crab	207,379	--	--	--

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Table II.B.2.b.-12

Offshore Shellfish Catches in Pounds

Species	1973	1974	1975	1976	1977
Dungeness Crab	329,661	61,457	19,910	--	--
Tanner Crab	--	--	428,043	140,020	--
Scallops	38,439	--	10,549	--	--

Source: Alaska Dept. of Fish and Game Statistical Records.

Between 1973 and 1977, American and Canadian fishermen caught 17,321,000 lbs. of halibut (table II.B.2.b.-13) in Yakutat waters (International Pacific Halibut Commission Statistical Areas 18W-23). This amounted to an annual mean of about three and a half million pounds. At the 1978 price of $1.24/lb., annual mean value of fishery to fishermen is $4.3 million.

During the 5-year period of 1969 through 1974, Japanese trawl and longline vessels caught 358,890,400 lbs. of bottomfish in waters off Yakutat (table II.B.2.b.-14). Yearly averages were approximately 849 metric tons of turbot; 1318 metric tons of other flatfishes; 10281 metric tons of sablefish; 179 metric tons of Pacific cod; 1244 metric tons of pollock; 16576 metric tons of Pacific ocean perch; 1281 metric tons of other rockfishes; and 898 metric tons of miscellaneous fishes.

Computed in terms of 1979 world market prices, average yearly value to fishermen is in excess of $23 million annually.

Records from the same area for Soviet catches are not complete, but we assume their catch is about 1/4 of the Japanese catch.

Based mainly on foreign bottomfish catch records in the Yakutat area, the North Pacific Fishery Management Council projected the following optimum yields (OY) for 1978 (to be shared between domestic and foreign fishermen as per NPFMC fishery management plan).

Pollock	27,500,000 lbs.
Cod	9,460,000 lbs.
Flounder	14,080,000 lbs.
Pacific Ocean Perch	17,380,000 lbs.
Other Rockfish	7,480,000 lbs.
Sablefish	7,480,000 lbs.
Atka Mackerel	2,200,000 lbs.
Squid	880,000 lbs.
Other Species	4,620,000 lbs.
TOTAL	91,080,000 lbs.

Source: NPFMC Plan, 1978.

Table II.B.2.b.-13
Catch IPHC Statistical Area 18W-23 in Pounds

Species	1973	1974	1975	1976	1977
Halibut	3,575,000	2,735,000	4,105,000	4,272,000	2,634,000

Table II.B.2.b.-14

Total Japanese Trawl and Longline Catch 1/

By Species or Species Group and Region in the Study Area

1969-74 (Metric Tons)

Species or Species Group	Region	
	Fairweather	Yakutat
Turbot	1383	2864
Other Flatfishes	2853	3735
Sablefish	31185	20222
Pacific Cod	156	740
Pollock	1573	4649
Pacific Ocean Perch	31649	51232
Other Rockfishes	3198	3205
Miscellaneous Fishes	2053	2435
TOTAL	74050	89082

1/ Round weight

Species	1973	1974	1975	1976	1977
Chinook	1,777	1,662	859	1,371	1,099
Sockeye	68,969	33,506	32,789	66,229	166,208
Coho	59,342	86,755	65,536	13,974	138,366
Chum	20,483	2,318	122	407	729
Pink	12,707	2,151	262,578	75,414	183,411
Total	121,178	68,985	361,884	157,395	463,644

Source: Alaska Dept. of Fish and Game Statistical Records.

Along the coast to the west of Yakutat Bay (fig. II.B.2.b.-1) subareas 192-30 (Yakataga River), 192-41 (Kaliakh River), 192-42 (Tsivat-Tsui Rivers), and 192-60 (Kiklukh River) produced 295,282 lbs. (table II.B.2.b.-3) of coho salmon over the 5-year period from 1973 through 1977. This amounted to an annual mean of 59,056 lbs. and, at the 1978 price of $0.91 a lb., had a yearly value of $53,741 to the fishermen.

Table II.B.2.b.-3

Inshore Salmon Fishery In Pounds Caught

Species	1973	1974	1975	1976	1977
Chinook					
Sockeye					
Coho	87,231	88,105		45,251	74,695
Chum					
Pink					
Total	87,231	88,105		45,251	74,695

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-6

Offshore Salmon Troll Fishery in Pounds--Area 181-00

Species	1973	1974	1975	1976	1977
Chinook	3,216	19,800	1,464	--	1,644
Sockeye	3	--	--	--	--
Coho	645	1,111	42	--	27,549
Chum	5	429	17	--	5
Pink	95	40	5	--	7
Total	3,964	21,380	1,528	--	29,205

Source: Alaska Dept. of Fish and Game Statistical Records.

Heavy inshore catches of shellfish over the 5-year period of 1973-77 were in Yakutat Bay and its immediate environs (statistical subunits 183-10, 183-20, 183-40, and 185-10) (table II.B.2.b.-7) and also Icy Bay (subunit 186-10) (table II.B.2.b.-8). In Yakutat Bay and nearby waters, annual mean catches were for (a) dungeness crab, 42,000 lbs.; (b) tanner crab, 237,000 lbs.; and (c) weathervane scallops, 5,100. At 1978 prices (dungeness, $0.70 lb.; tanner, $0.28 lb.; and scallops, $3.00 lb.), annual values are $29,000, $66,000, and $15,000 (rounded values), respectively. Average annual Icy Bay catches were (a) dungeness crab, 388,000 lbs.; (b) tanner crab, 295,000 lbs.; and (c) weathervane scallops, 4,900 lbs. Average annual values are $270,000, $82,000, and $15,000 for these fisheries.

The only other shellfish catches in inshore subdistricts were harvested some distance to the east and south of Yakutat Bay in subdistricts 116-11, 116-12, and 116-13. Average annual catches (for the same 5-year period) were (a) dungeness crab, 44,000 lbs. and (b) tanner crab, 10,900 lbs. Fisheries are worth $31,000 and $3,000 annually to fishermen.

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-10

Offshore Shellfish Catches in Pounds

Species	1973	1974	1975	1976	
Dungeness Crab	950,791	182,810	166,781	67,251	
Tanner Crab	2,856	1,254,382	1,135,123	239,847	
Scallops	135,261	264,306	98,913	168,432	20

Source: Alaska Dept. of Fish and Game Statistical Records.

Table II.B.2.b.-11

Offshore Shellfish Catches in Pounds

Species	1973	1974	1975	1976	1
Dungeness Crab	306,540	237,660	81,714	63,260	
Tanner Crab	12,751	548,465	118,657	464,629	167
Scallops	--	--	--	11,966	

Source: Alaska Dept. of Fish and Game Statistical Records.

977

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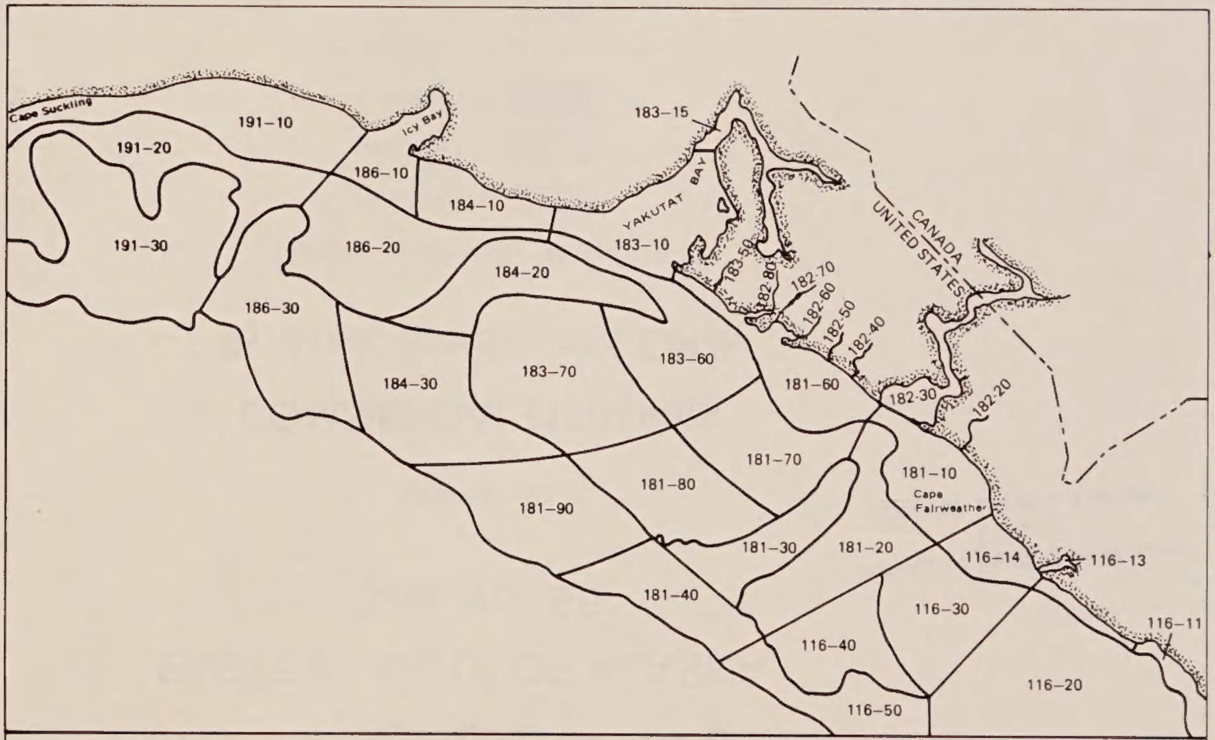
Source: U.S. Dept. Commerce, 1978 (Ronholt, et al.)

Figure II.B.2.b.-1.



YAKUTAT AND OFFSHORE FISHERY MANAGEMENT UNITS

Source: Alaska Dept. of Fish and Game, 1978

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Alaska Outer Continental Shelf Office

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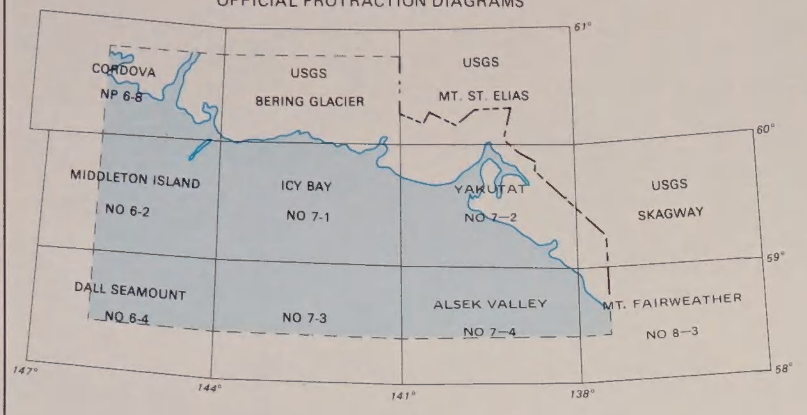
GRAPHIC NO. 6

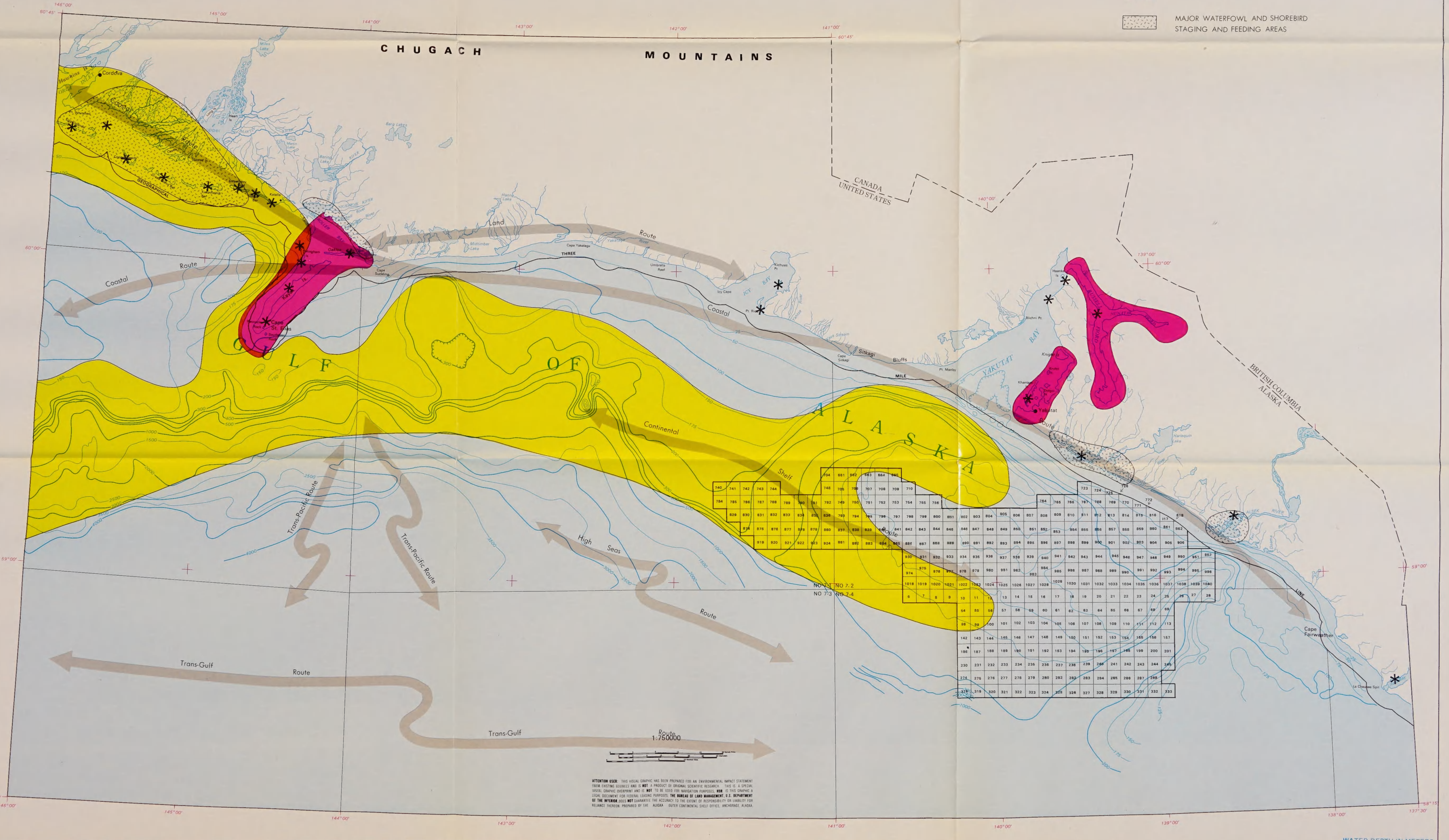
MARINE AND COASTAL BIRDS

*	SEABIRD COLONIES
🟨	HIGH DENSITY SEABIRD FORAGING AREAS
⇔	PRIMARY BIRD MIGRATION ROUTES
🟥	BIRD WINTERING AREAS
▨	MAJOR WATERFOWL AND SHOREBIRD STAGING AND FEEDING AREAS

COVERAGE DIAGRAM FOR BLM OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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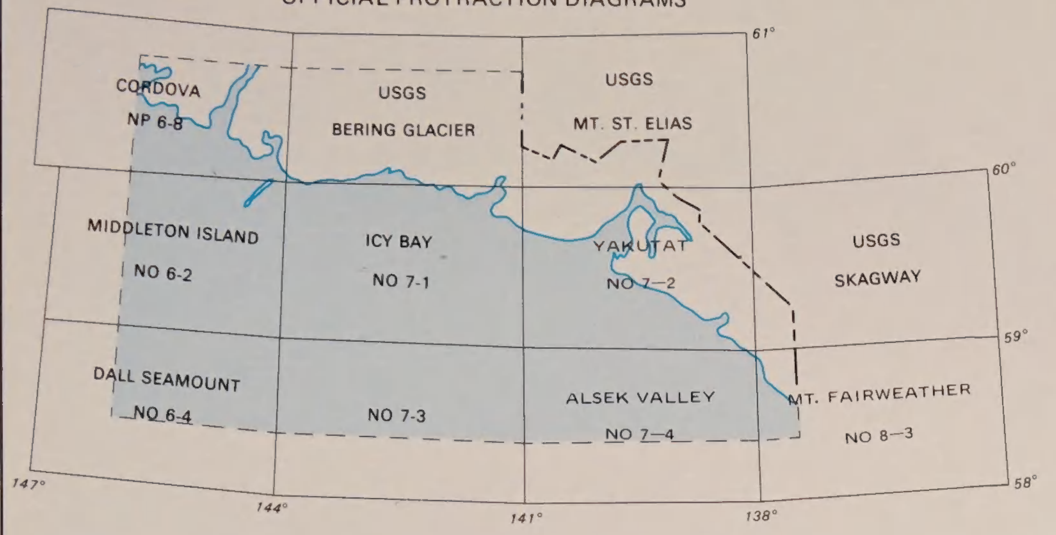
COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



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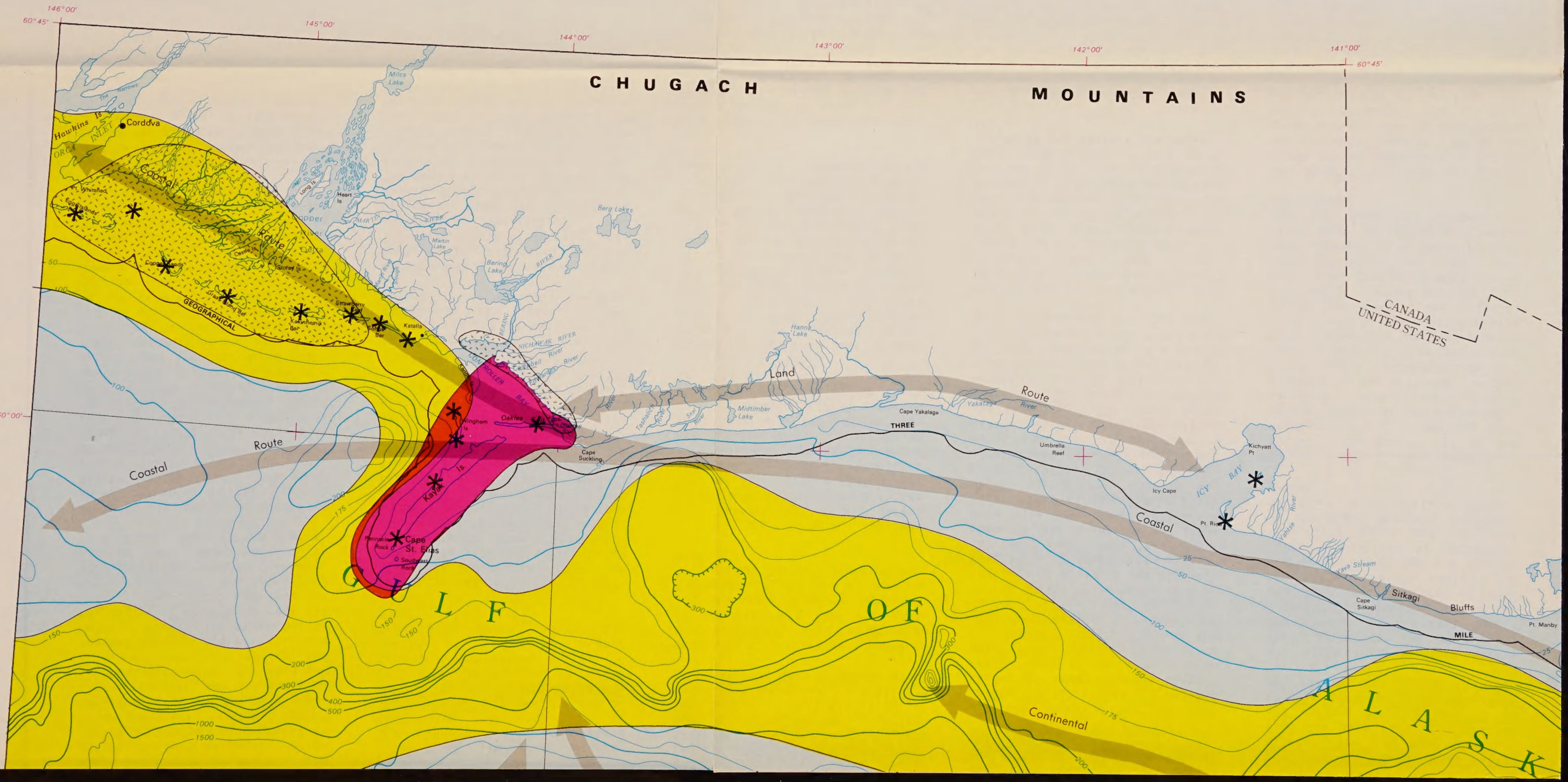

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Alaska Outer Continental Shelf Office

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

EASTERN GULF OF ALASKA
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GRAPHIC NO. 6

MARINE AND COASTAL BIRDS

*	SEABIRD COLONIES
🟨	HIGH DENSITY SEABIRD FORAGING AREAS
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🟥	BIRD WINTERING AREAS
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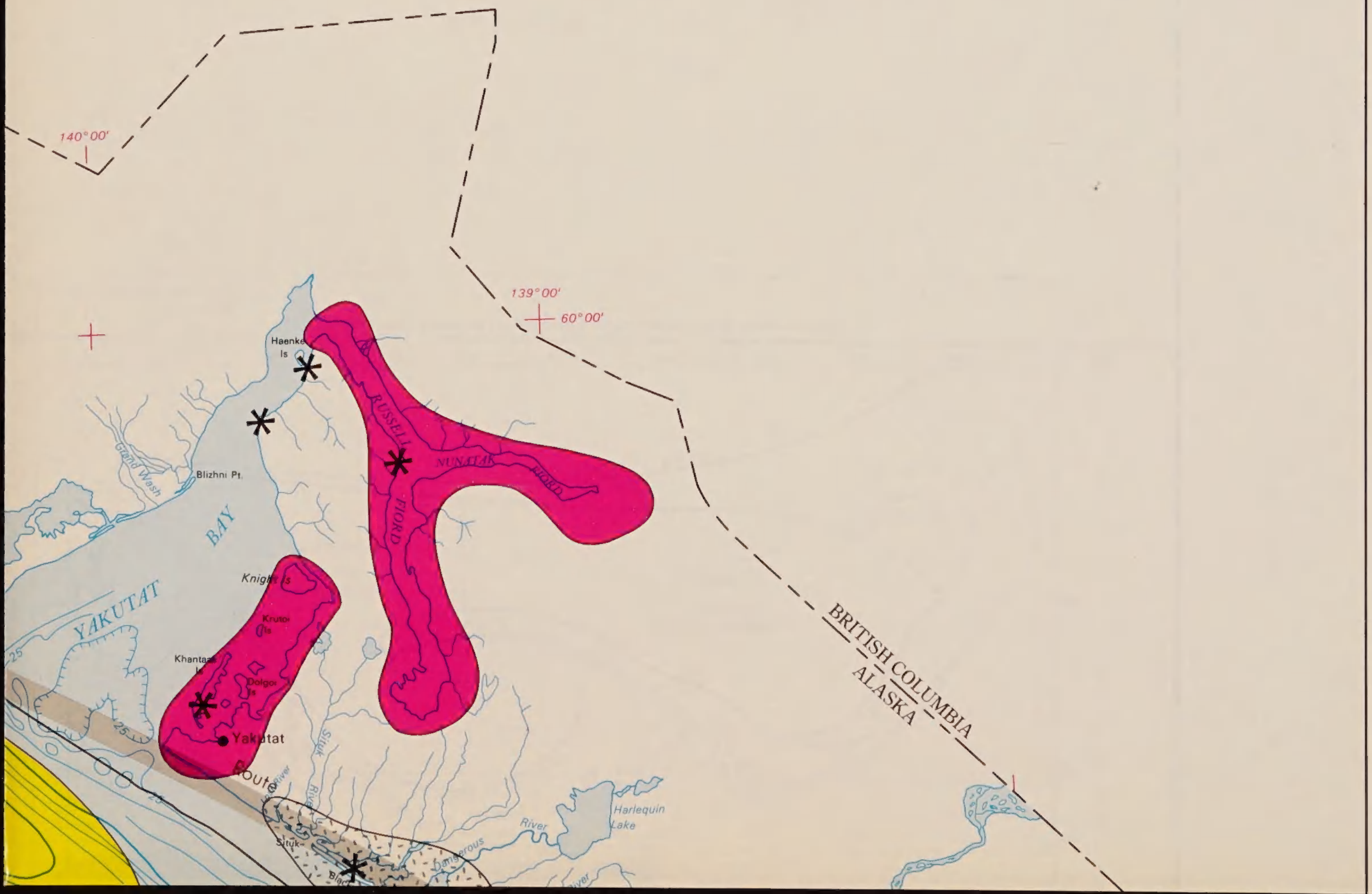

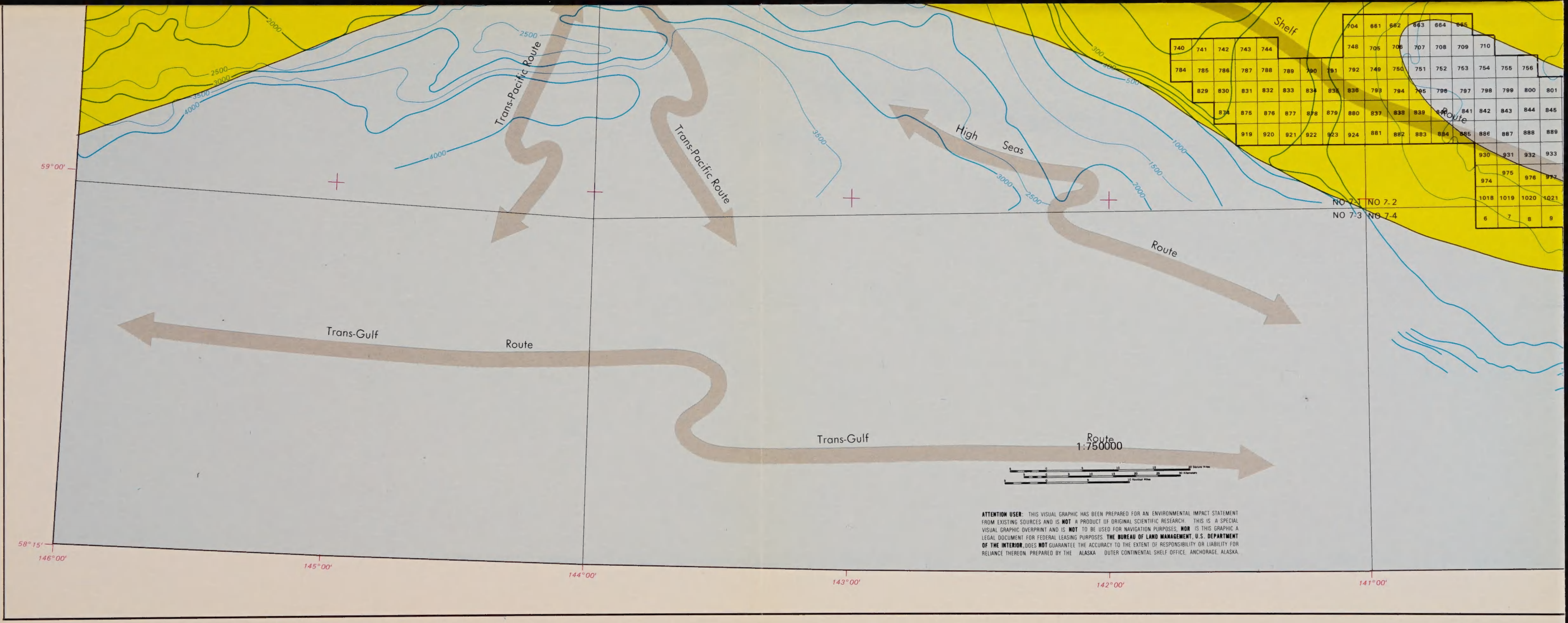

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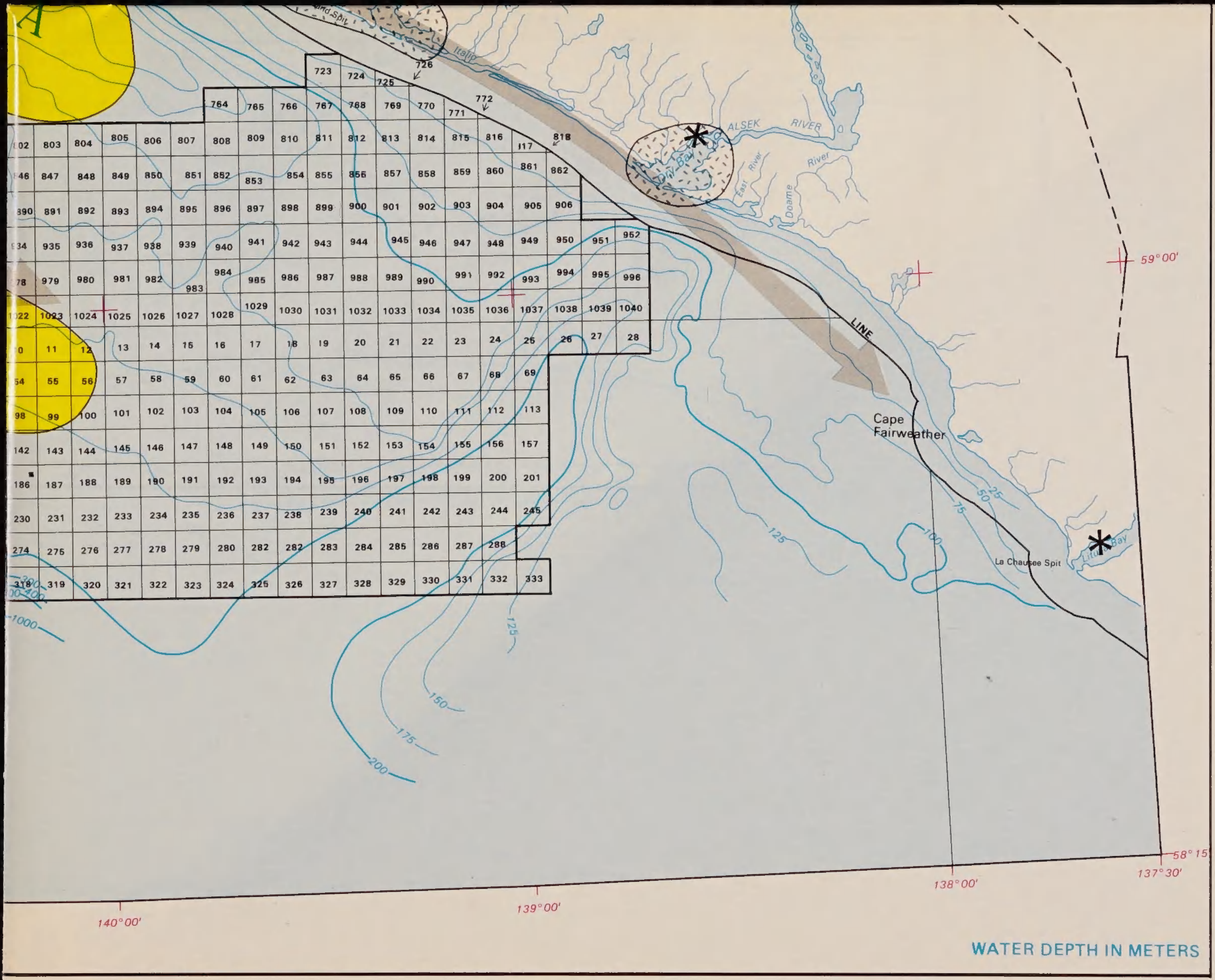
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GRAPHIC NO. 6

MARINE AND COASTAL BIRDS

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

II.B.3.
Marine and Coastal Birds

The density and species diversity of birds along the Gulf of Alaska coast is extensive. Many of the *birds that breed or migrate west* across the Gulf of Alaska, originated in transpacific (Asia) or transequatorial regions; consequently, birds are not only a national resource, but are truly an international resource. As a result, most of the marine and coastal species occurring in the Gulf of Alaska are protected by the Migratory Bird Treaty Act (16 U.S.C., sec. 703), and international agreements regarding management of many species have been entered into under conventions with Japan, Russia, and Mexico.

At least 219 species of birds are known to occur in the Gulf of Alaska coast/Prince William Sound region (Isleib and Kessel, 1973). Of these species, 111 are mainly regarded to be water-oriented. There are about 181 species in the spring, 163 in summer, 180 in fall, and 109 in winter. Approximately 101 species of water-oriented birds are considered year-round residents of the gulf area. According to Isleib and Kessel (1973), about 72 bird species are in the tens of thousands and 10 species are in the millions. Sanger (1972b) divided the north Pacific region into simplified surface domains based on isosals. The northeastern Gulf of Alaska is located within the coastal domain (see figure II.B.3.-1).

During the winter, small alcids such as ancient and marbled murrelets are predominant with glaucous-winged gulls, herring gulls, fulmars, and common murres.

During the summer, sooty shearwaters and *short-tailed shearwaters*, combined, total over 80 percent of marine avifauna. Petrels, gulls, jaegers, and phalaropes are also relatively common. (Sanger, 1972b).

Kessel (1972) and Isleib and Kessel (1973) have characterized avian habitats in the northern Gulf of Alaska into 14 categories. For ease of discussion, the 14 habitats have been combined into 4 major zones: offshore waters, inshore waters, tidal zone, and land and inland waters (see figure II.B.3.-2).

The following discussion of the seasonal occurrence of the avifauna of the 4 habitat zones has been taken primarily from Kessel (1972) and Isleib and Kessel (1973).

a. Offshore Waters: The offshore area encompasses that water area, regardless of depth, beyond 5.6 km from shore. Feeding by birds usually occurs at or near the surface. According to Isleib and Kessel (1973), 56 species of pelagic or oceanic birds occur regularly within this zone.

During spring, millions of pelagic birds and migrants move into and across offshore areas of the northern gulf. Many of the birds are transpacific migrants, continental shelf migrants, high seas migrants, and possibly transgulf migrants. Kittiwakes, alcids, phalaropes, terns, petrels, and jaegers, arriving from more southern latitudes, feed by the millions within the offshore area while enroute to their breeding grounds. Most ducks, geese, swans, and cranes use the coastal migration route in spring and quickly traverse the area as migrants. Several species of strong-flying shorebirds also enter Alaska through the offshore region.

During summer, the offshore region hosts large numbers of southern latitude pelagic birds (e.g., albatrosses, shearwaters, and petrels). Peak use of offshore waters occurs during early fall; the summer pelagics are still present when post-breeding species such as kittiwakes, gulls, terns, jaegers, murres, murrelets, puffins, and phalaropes disperse from breeding locations to offshore feeding areas prior to migration.

Wohl (1975b) found the most abundant birds in September in the area between Kayak Island and Yakutat Bay to be shearwaters, fulmars, black-legged kittiwakes, glaucous-winged gulls, herring gulls, and black-footed albatrosses.

During their fall migration, about 150,000 lesser Canada geese, 25,000 snow geese, 200,000 white-fronted geese, 20,000 sandhill crane, 50,000 swans, 1,000,000 ducks, and 35,000 dusky Canada geese migrate through the nearshore and offshore area of the Gulf of Alaska.

Bartonek and Sowl (1972) provide the following population estimates for birds occurring in the northeastern gulf during the summer: approximately 9 million birds (albatrosses, 30,000; shearwaters and petrels, 4,250,000; storm petrels and phalaropes, 715,000; jaegers, gulls, and terns, 50,000; and alcids, 4,000,000). During late winter, Isleib (1975) estimates that approximately 1 million birds use the Gulf of Alaska area.

More recent population estimates made by OCSEAP, under the auspices of BLM, indicate that the gulf region has a standing stock of 1.5 million birds, and as many as 48 million during spring migration.

b. Inshore Waters: The inshore zone is all waters within 5.6 km of shore and to seaward of all outer coastal points and islands. Waters within this zone retain a shore influence and are shallow enough for birds to feed on or near the bottom. Isleib and Kessel (1973) reported that about 87 species of birds use this zone.

During spring, this zone is used primarily by migrating loons, grebes, waterfowl, hawks, eagles, cranes, shorebirds, and gulls which follow the coastal migration route. During summer, inshore waters are heavily used by large numbers of nonbreeding and breeding birds along the coast, such as seaducks, including white-winged, surf, and black scoters, and cormorants, which together, number several thousand during summer.

Large numbers of birds overwinter within the inshore area, especially along the shores of bays and inlets. Mallards, goldeneyes, buffleheads, oldsquaws, harlequin ducks, mergansers, scoters, cormorants, and alcids total in the hundreds of thousands during the winter season. Concentrations of birds during winter are usually in water depths of 90 m or less and are located specifically near tidal flats and reefs.

Within both the offshore and inshore water zones, great concentrations of birds congregate to feed. Food is concentrated in these two zones by such forces as upwellings, freshwater outflows, and wind and wave action.

c. Tidal Zone: The tidal zone is the coastal area between the low and high tides and includes sandy beaches, mud flats, rocky shores, and reefs. This zone is the most heavily used area along the gulf coast; approximately 177 species inhabit this zone.

Although rocky shores and many islets and sea stacks are present, sandy and muddy beaches characterize much of the northeastern gulf coast. Miles of mud flats are exposed at low tide on the many river deltas.

During spring, tremendous concentrations of arriving and migrating waterfowl and shorebirds utilize the tidal zone. Densities of more than 250,000 shorebirds per square mile have been observed on the tidal flats of the Copper River Delta during May (Isleib and Kessel, 1973). Each spring, the tidal flats of the Copper River Delta are host to more than 20 million birds, mostly shorebirds and waterfowl. The entire North American population of western sandpipers and the West Coast population of dunlins funnel through the gulf coast region in migration and concentrate on the tidal flats as a staging and foraging area.

Between April 24 and May 12, 1975, about 453,800 shorebirds passed through Orca Inlet (USDI, 1975g). During the afternoon of April 27, 1971, about 5,500 pintail ducks per hour and 500 whistling swans per hour passed just north of Strawberry Point entering Prince William Sound along a migratory route heavily used in late April and early May (Isleib and Kessel, 1973).

During summer, the tidal zone is utilized for feeding by breeding and nonbreeding shorebirds, gulls, and waterfowl. During fall, the tidal zone is again heavily used by migrating waterfowl, gulls, terns, and shorebirds. Severe southeast storms restrict migratory movements and, as a result, large numbers of ducks, geese, swans, and cranes are concentrated on the Copper and Bering River Deltas. A concentration of over 10,000 arctic terns have been observed on the east side of Yakutat Bay near Ocean Cape. Estimated concentrations of 100,000 white-fronted geese have been observed along the Martin River and on the Bering River Delta.

During winter, tens of thousands of shorebirds frequent the rocky shores and reefs of the tidal zone. Bald eagles, ravens, crows, and gulls use the tidal flats as a primary foraging area.

d. Land and Inland Waters: The land zone stretches from the high tide zone towards the uplands and includes 10 of the 14 avian habitats described by Isleib and Kessel (1973).

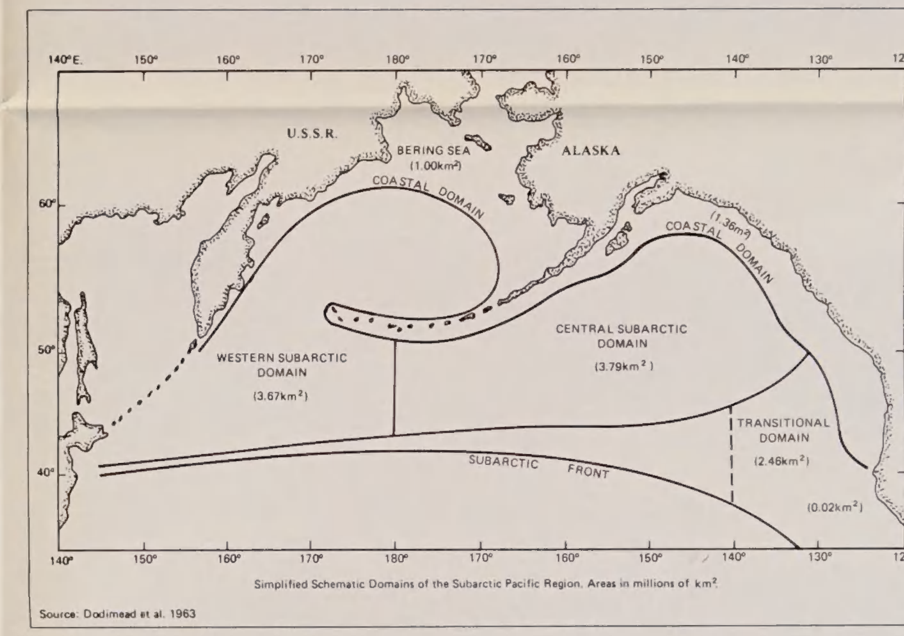
All birds come to land during their particular nesting period. The northern gulf coast has a variety of habitats which are used by a broad spectrum of breeding birds. Colony nesters are found on islands and sea cliffs. Large populations of waterfowl, shorebirds, gulls, and terns nest on the higher beaches, wetlands, and brackish water flats of river deltas.

During summer, land areas are heavily utilized by all of the nesting species; summering passerines number in the hundreds of thousands, with a few numbering probably in the millions. Alcids, black-legged kittiwakes, cormorants, glaucous-winged gulls, and arctic terns are the most abundant birds found on the coastal bluffs, rocks, sea stacks, and islands. Kittiwakes, tufted puffins, and glaucous-winged gulls each number more than a million birds. Several species of noncolonial seabirds such as pigeon guillemots also nest along the northeastern gulf coast.

The Yakutat Forelands are recognized as an important waterfowl and shorebird habitat. Birds congregate where food is concentrated by ocean elements, tidal and wind action, freshwater outflows, and upwelling. In addition, another potential major foraging area is along the continental shelf/slope. Isleib (1975) observed the biggest bird densities along a narrow surface area between the 180m-1800m contours.

Isleib and Kessel (1973) stated that large concentrations of migrating birds are found in the northeastern gulf coast region because geographically, the region is along the Pacific flyway route.

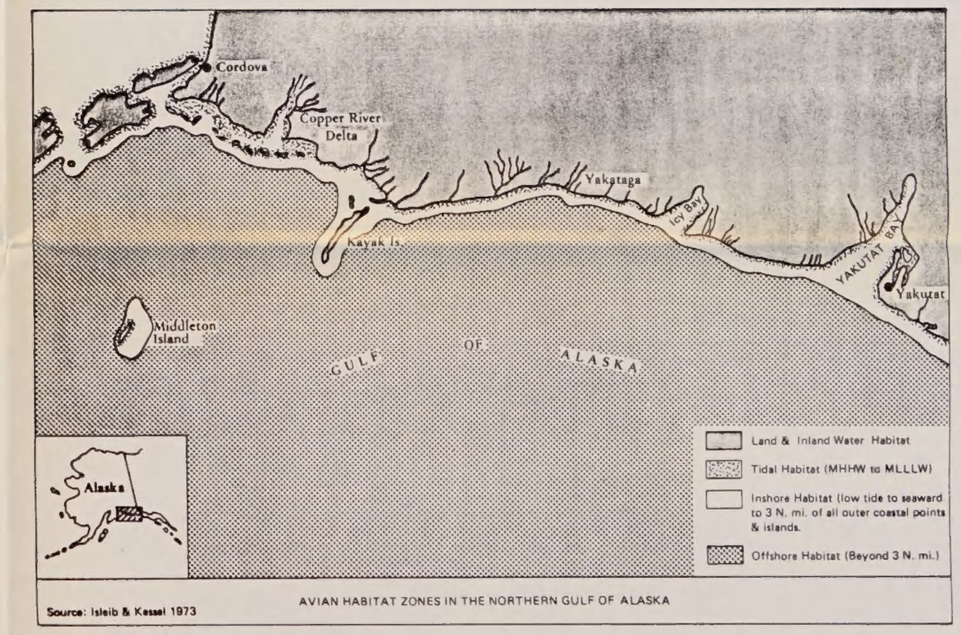
Figure II.B.3.-1.



Simplified Schematic Domains of the Subarctic Pacific Region. Areas in millions of km².

Source: Dodimead et al. 1963

Figure II.B.3.-2.


Cordova
Copper River Delta
Yakataga
Icy Bay
Kayak Is.
YAKUTAT BAY
Yakutat
Middleton Island
GULF OF ALASKA
Alaska
Land & Inland Water Habitat
Tidal Habitat (MHHW to MLLLW)
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Offshore Habitat (Beyond 3 N. mi.)

AVIAN HABITAT ZONES IN THE NORTHERN GULF OF ALASKA

Source: Isleib & Kessel 1973

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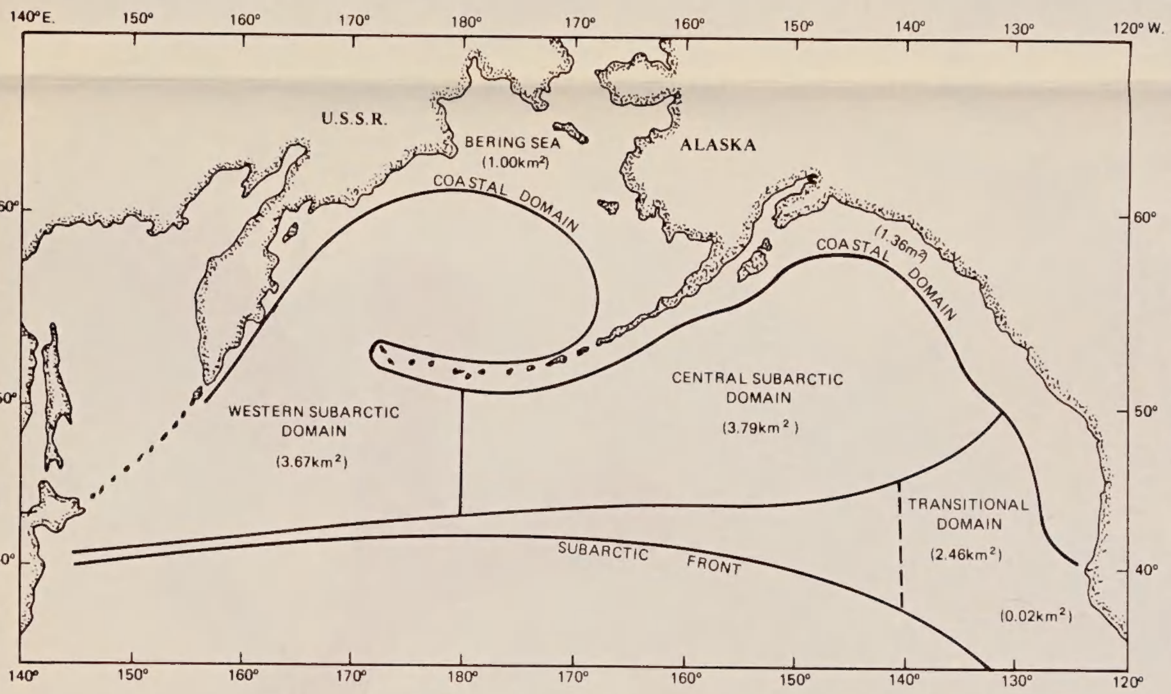

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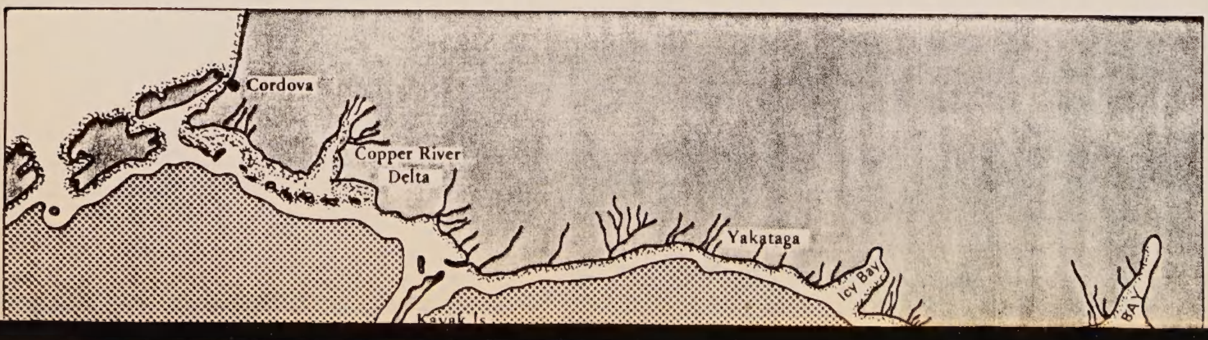

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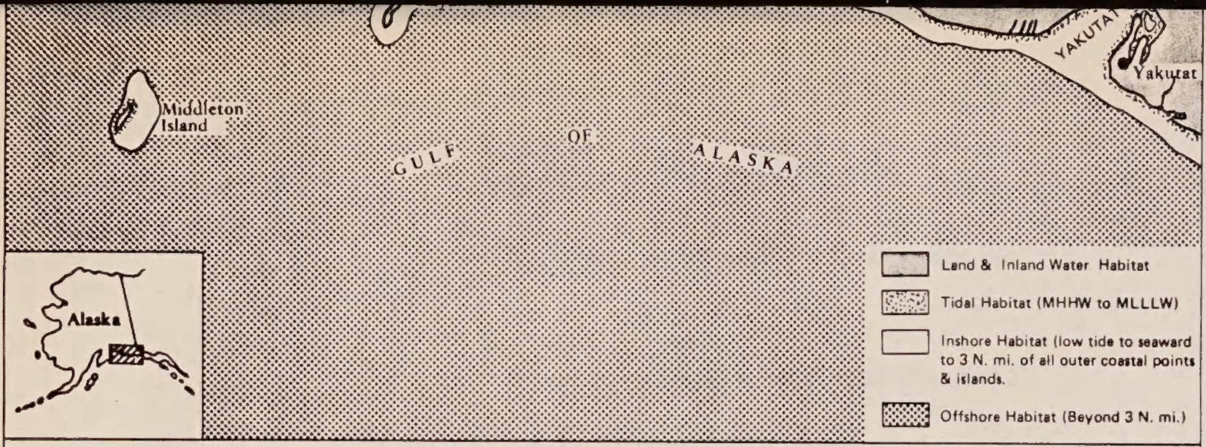
Middleton Island
GULF OF ALASKA
YAKUTAT
Yakutat
Alaska
▨ Land & Inland Water Habitat
▨ Tidal Habitat (MHHW to MLLLW)
☐ Inshore Habitat (low tide to seaward to 3 N. mi. of all outer coastal points & islands.
▩ Offshore Habitat (Beyond 3 N. mi.)

Source: Isleib & Kessel 1973

AVIAN HABITAT ZONES IN THE NORTHERN GULF OF ALASKA

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Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

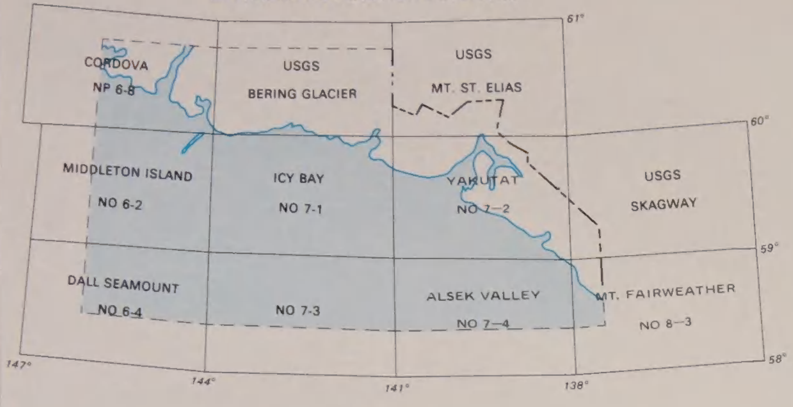
Bureau of Land Management
Library
Denver Service Center

GRAPHIC NO. 7

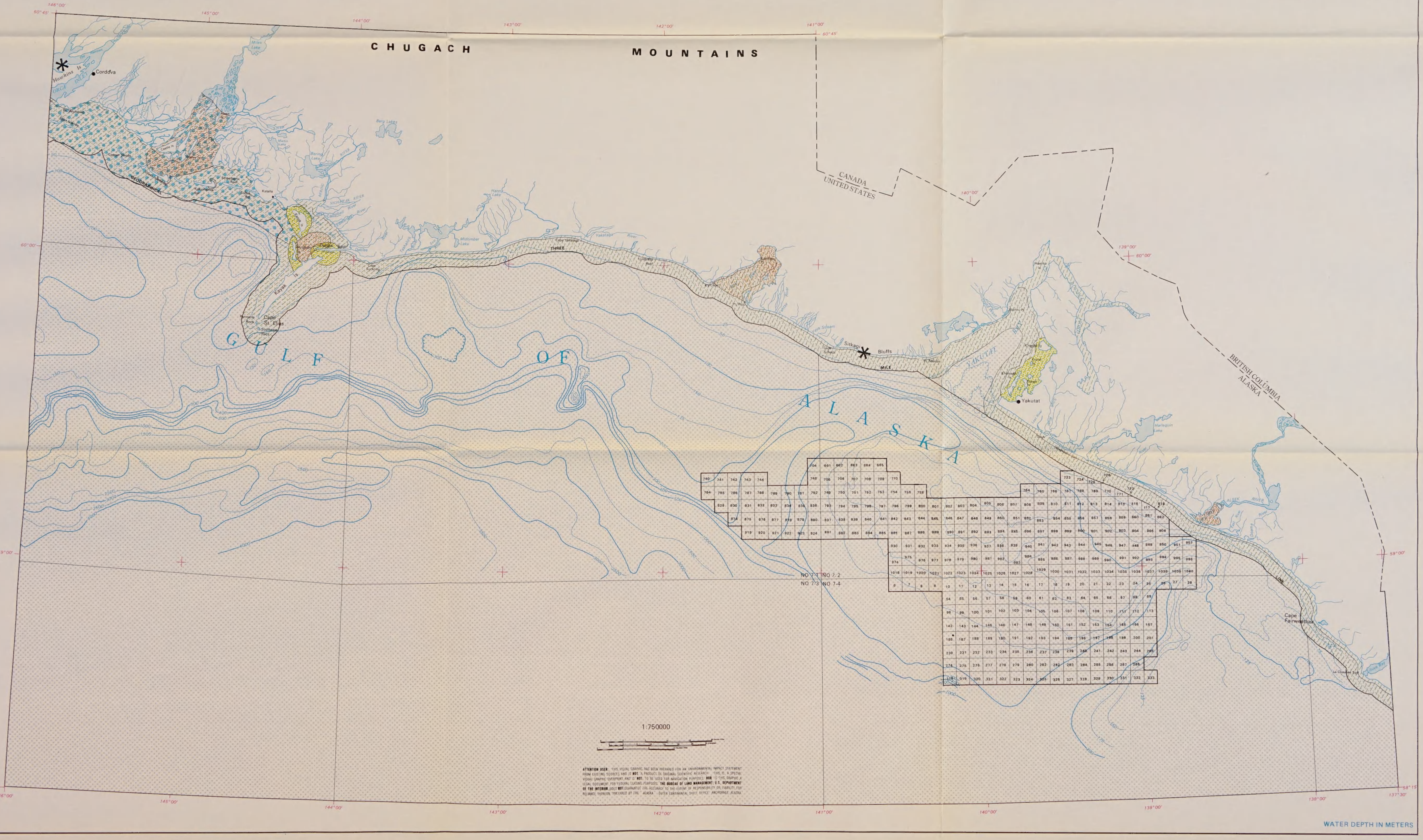
MARINE MAMMALS

▨ SEA OTTER
▨ HARBOR SEAL — PRESENT
▨ HARBOR SEAL — HIGH DENSITY
▨ SEA OTTER / SEA LION / SEAL — POSSIBLE EXTENSION OF HABITAT
▨ MIGRATION AND OCCURRENCE OF FUR SEALS AND NONENDANGERED CETACEANS
* STELLER SEA LION CONCENTRATIONS ROOKERIES AND HAULING GROUNDS

COVERAGE DIAGRAM FOR BLM OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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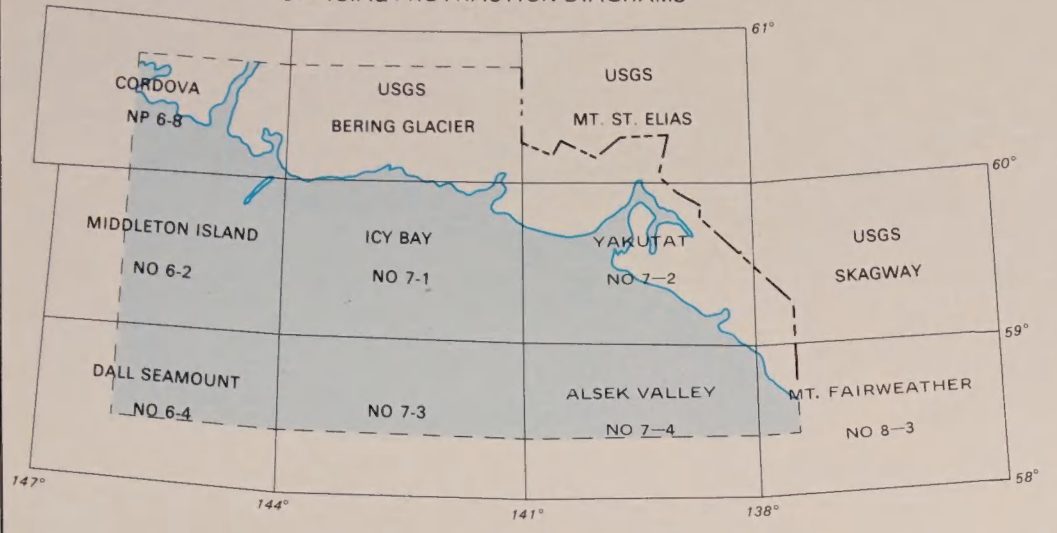
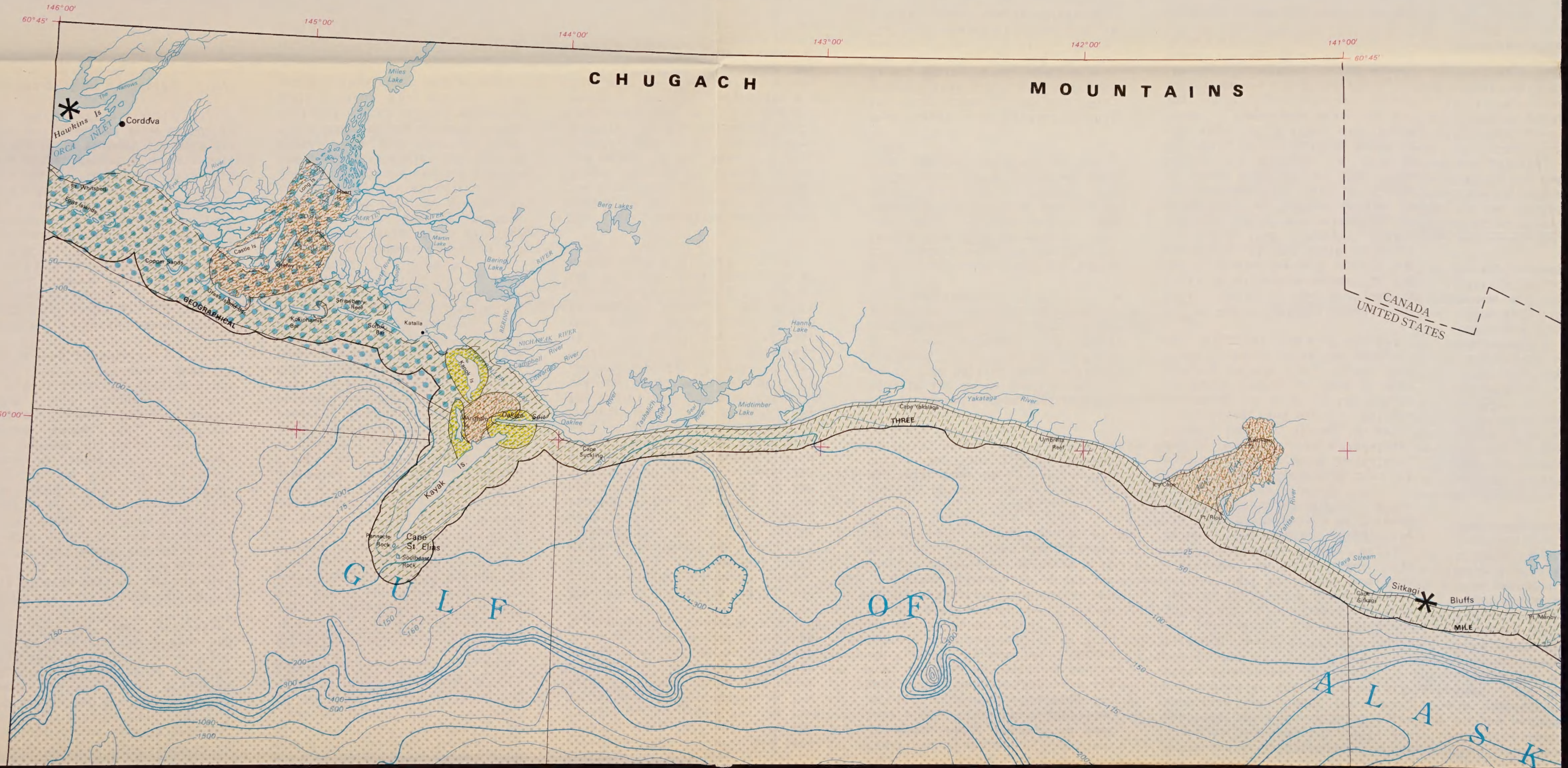
WATER DEPTH IN METERS

COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



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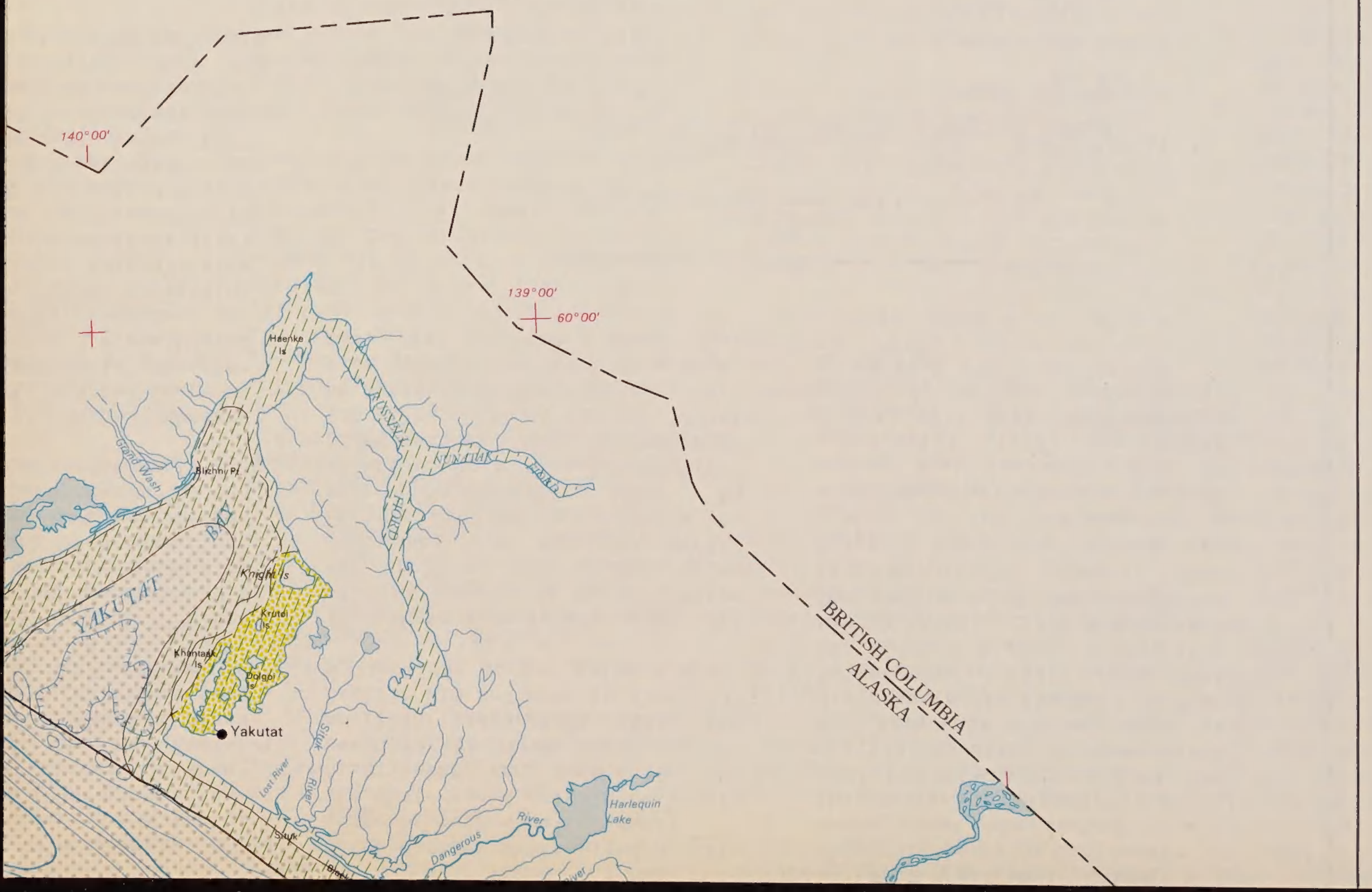

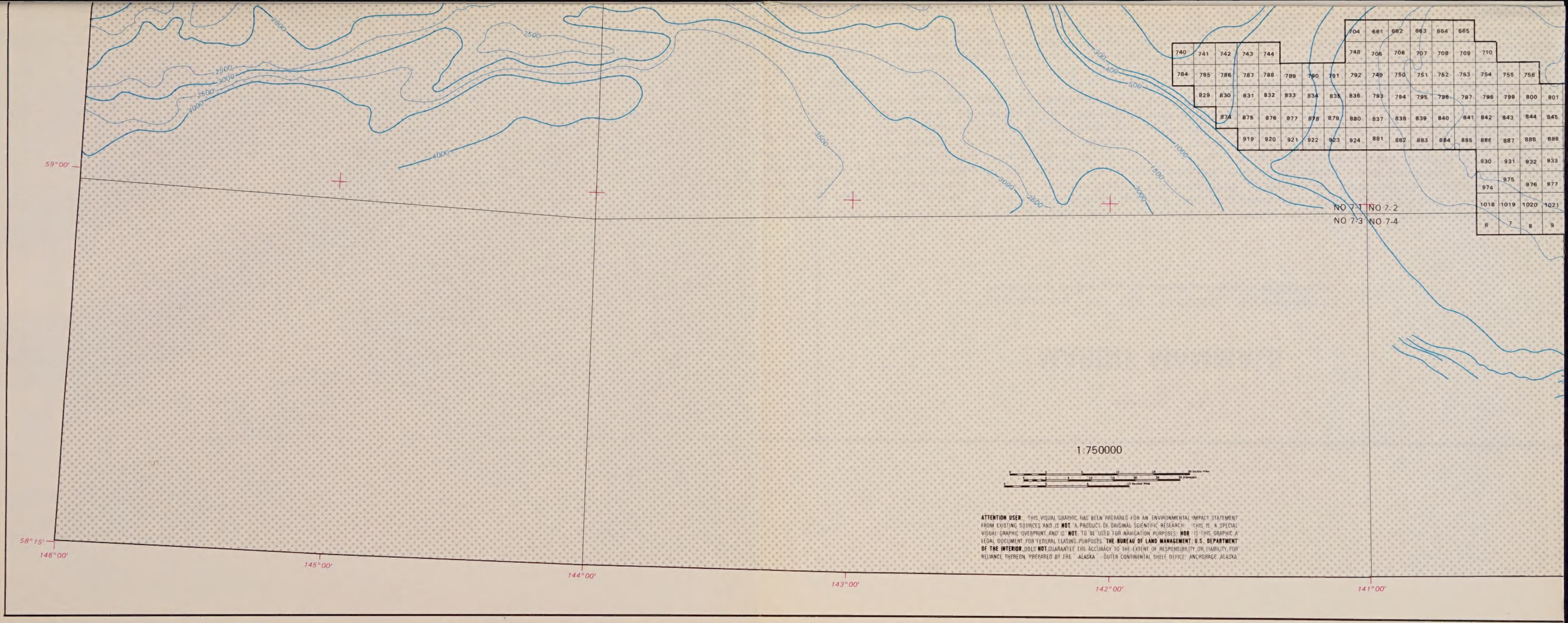

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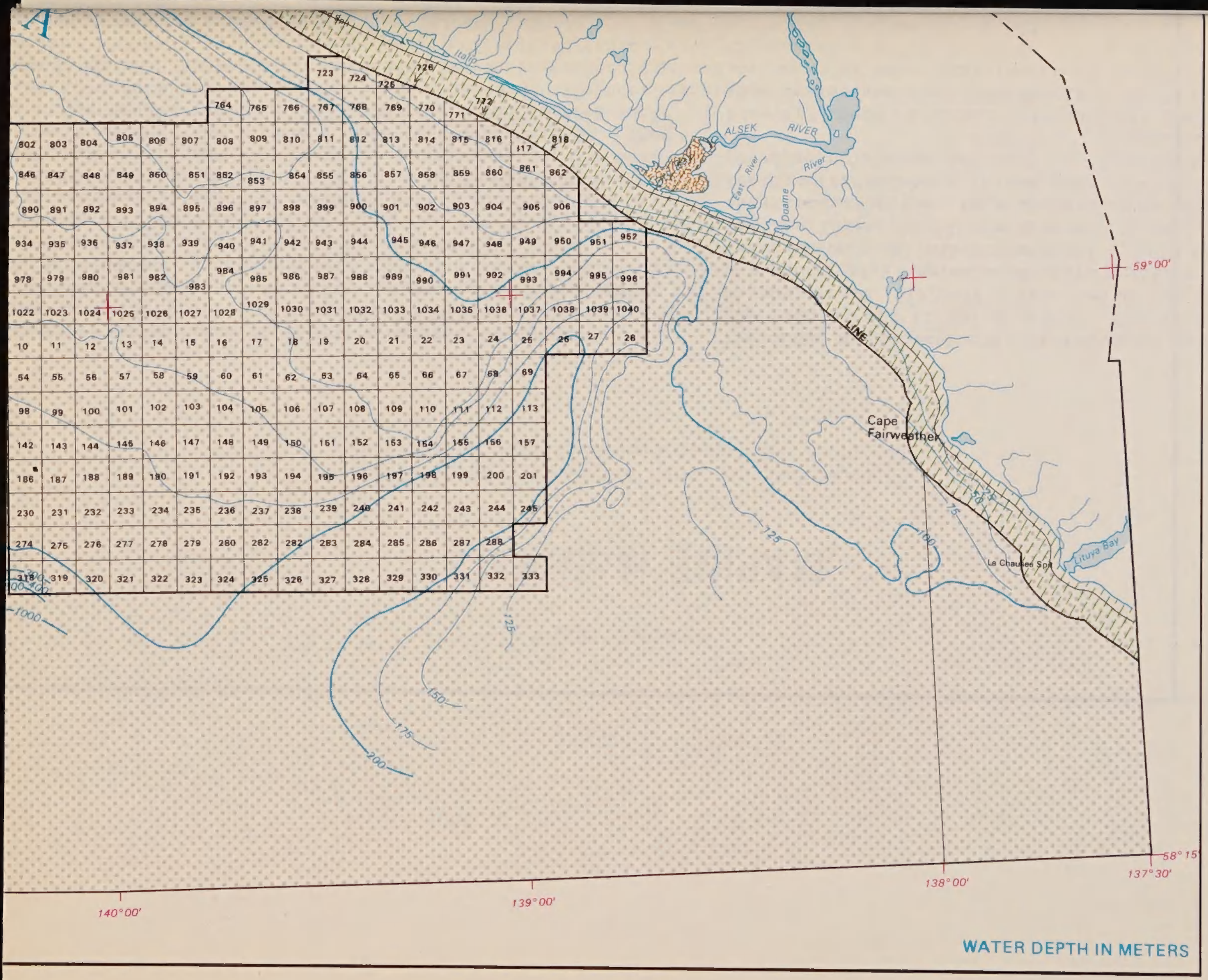
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GRAPHIC NO. 7

MARINE MAMMALS

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

II.B.4.
Marine Mammals

This section addresses the distribution, migration, feeding behavior, and abundance of marine mammals, other than those classified as endangered or threatened. Endangered and threatened species are discussed in sec. II.B.6.

According to the Marine Mammal Protection Act of 1972, the Congress of the United States recognized that human uncontrolled activities are, or may be, threatening certain species and population stocks of marine mammals with depletion or extinction. The act also emphasized the importance of mammals in the marine ecosystem and endorsed a policy of resource management with the primary objective to maintain the health and stability of the ecosystem.

Except for subsistence use by certain Alaskan Natives and for display and scientific collections, the Marine Mammal Protection Act of 1972 prohibits the harvest of marine mammals by United States' vessels or foreign vessels using U.S. ports. An exception is made for the fur seal which is regulated by international treaty. The harvest of these seals, is shared among four countries: United States, Canada, Soviet Union, and Greenland. Table II.B.4.-1 lists the species diversity, their occurrence, density, and feeding behavior.

There are 22 marine mammal species which are found as resident or seasonal migrants in the Gulf of Alaska. Seven species are considered to be endangered (see sec. II.B.6.). Most abundant year-round marine mammals in the northeastern Gulf of Alaska are the sea lion, harbor seal, sea otter, Dall and harbor porpoise, and beluga whale. The total marine mammals either residing in or annually migrating through the gulf region is estimated from 90,000 to 100,000 (Scheffer, 1972).

Sea Otter (Enhydra lutris). Originally the sea otter ranged along northern coastal areas of the Pacific Ocean and Bering Sea south to the Kuril Islands and Hokkaido Island on the west and to southern California on the east (Lensink, 1960 and Kenyon, 1969). In the northeastern Gulf of Alaska, sea otters are present from the southern tip of the Kenai Peninsula east to the Prince William Sound region. Further to the east, sea otters occur in the Controller and Yakutat Bay areas. Concentrations of sea otters near the proposed lease area are found in the waters adjacent to Kayak, Hinchinbrook, and Montague Islands (Alaska Dept. of Fish and Game, 1973a; Pitcher & Vania, 1973; Lensink, 1962).

Sea otters inhabit shallow coastal waters less than 90 m deep. Rocky reefs and shoals exposed to the open ocean, offshore rocks, and kelp beds are their preferred areas. Their primary habitat requirements are clean water and an abundance of marine invertebrates (mollusks, echinoderms, and crustaceans) and demersal fish for food (ADF&G, 1973a; Calkins, et al., 1975).

No indication has been found that the sea otter is able to obtain pelagic food items. Thus, long migratory movements through the open ocean are precluded. At Amchitka Island, the home range of individual sea otters was about 5 to 10 miles of coastal waters (Kenyon, 1972).

Steller Sea Lion (Eumetopias jubatus). The Steller sea lion ranges from the Sea of Japan northward around the north Pacific rim, including the Okhotsk and Bering Seas, southward to the California Channel Islands.

In Alaska, the sea lion is a common inhabitant of the littoral zone above the continental shelf. According to Fiscus and Baines (1966), sea lions generally forage in waters (less than 50 fathoms deep) within 15 miles of shore; however, Kenyon and Rice (1961) observed sea lions 70 to 85 nautical miles offshore in the Bering Sea. Steller sea lions have not been considered to undertake regular migrations as do the northern fur seals; however, seasonal movements (both latitudinal and longitudinal) do occur (Kenyon and Rice, 1961).

The most pronounced characteristic of the sea lion, which distinguishes it from other marine mammals in the Gulf of Alaska, is its affinity for specific, well-defined locations used as breeding and pupping rookeries and hauling areas. Sea lion breeding rookeries and hauling grounds occupy isolated rocks, islets, and rocky points along the mainland and outer island coast of the northeastern gulf. Adult sea lions gather on their breeding rookeries in late May. Although these same rookeries are used during winter, some sea lions leave the rookeries during winter months in favor of more protected hauling grounds; e.g., in Prince William Sound (Glacier Island, Perry Island, and Point Eleanor) (Pitcher, 1975). Alaska has 202 known sea lion rookeries; 91 of these are located in the vicinity of the northeast Gulf of Alaska region (Calkins, et al., 1975).

The entire Alaskan sea lion population was estimated at 200,000 (Alaska Dept. of Fish and Game, 1973a). Calkins, et al. (1975) reported a sea lion population estimate of about 95,000 animals.

Although sea lions have been known to follow predictable feeding patterns, such as concentrating on herring spawning schools in spring (Alaska Dept. of Fish and Game, 1973a), they are known to feed on a variety of fish and crustaceans. Steller sea lions in Alaska are generally considered to feed on capelin, sand lance, herring, rockfish, sculpins, flatfish, and salmon (Fiscus and Baines, 1966; Mathisen, et al., 1962; Pike, 1958; and Brooks, 1957).

Northern Fur Seal (Callorhinus ursinus). The fur seal has been managed since 1911 under the authority of the Treaty for the Preservation and Protection of Fur Seals (37 Stat. 1542), and under the Interim Convention on Conservation of North Pacific Fur Seals. It is probably the best-known species among the pinnipeds of Alaska.

According to Scheffer (1972), the Gulf of Alaska represents a significant wintering area for adult males. Fiscus and Kajimura (1970) reported that during their northward migration (primarily March through May), thousands of fur seals have been observed in the northeastern gulf. In June, females are known to concentrate in the Portlock Bank area; they move west in July and are replaced by younger males and females. By the end of June, no breeding males are in the northeastern gulf; by the end of July, all pregnant females are also gone (Scheffer, 1972). During winter and spring, fur seals concentrate on the Fairweather Ground in the north-central and eastern gulf and on the Portlock Bank northeast of Kodiak Island (Baker, et al., 1970).

The annual migration and distribution of the northern fur seal has been described by Huey (1942), Kenyon and Wilke (1953), Wilke and Kenyon (1954), Baker, et al., (1970), and Fiscus and Kajimura (1970). Of the estimated world population of about 1.6 million northern fur seals, approximately 1.2 million congregate on the Pribilof Islands from about May to November. During the remainder of the year, the immature seals and adult females migrate to favored feeding areas above the continental shelf (generally 10 to 100 miles offshore) from the Bering Sea south along both sides of the Pacific Ocean to about 32° N. latitude. Older and male fur seals generally stay in the northeastern gulf area. By March and April, most of the herd is again in Alaskan waters.

Principal food items of pelagic fur seals in the gulf are walleye pollock, several species of squid, Atka mackerel, and three species of salmon (Anonymous, 1970).

Harbor Seal (Phoca vitulina richardi). The land-breeding harbor seal in the north Pacific Ocean ranges from the southeastern Bering Sea, the north side of the Alaska Peninsula and Aleutian Islands, along the northern gulf coast, and south along the North American coast to southern California.

Harbor seals are the predominant nearshore seals in ice-free waters north of 35° N. latitude. Along the northern gulf coast they are commonly found nearshore in waters less than 30 fathoms. They usually favor sandy beaches or sand bars along either offshore islands or the mainland. Floating ice pans from glaciers (e.g., in Icy Bay) are used by seals for hauling out when available. During winter, ice shelves, which form at the heads of bays, are frequently used as hauling platforms. The versatility of the harbor seal is further illustrated by its successful habitation of areas with varying bottom types, water clarity, and salinity (Calkins, et al., 1975).

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The estimated harbor seal population in the north Pacific region is 750,000 (Alaska Dept. of Fish and Game, 1973a). In Alaska, harbor seals outnumber all other seals (Brooks, 1963), with an estimated total population of about 100,000 (Klinkhart, 1969).

Harbor seals are found all along the northern coast of the Gulf of Alaska from Cape Spencer to Yakutat Bay. Concentrations are found in certain bays and at the mouths of rivers. About 100 seals have been observed near Cape Spencer (Calkins, et al., 1975).

Harbor seals are abundant in shallow-water areas of Dry Bay, Dangerous River tidal flats; Copper River, Bering River, and Controller Bay regions; and at the mouths of the East Alsek, Akive, Italio, Dangerous, and Situk Rivers. Seals are found throughout Yakutat Bay and are particularly abundant on floating ice from Hubbard Glacier. Icy Bay contains a relatively large concentration of harbor seals. Numerous fiords and shallow water estuaries from Orca Bay and Prince William Sound to the tip of the Kenai Peninsula also provide habitat for harbor seals.

The diet of harbor seals varies according to season and location but generally includes pelagic, demersal, and anadromous fish, cephalopods, and crustaceans. According to Calkins, et al (1975), harbor seals primarily feed on a variety of fish, including herring, codfish, flounders, smelt, rockfish, sculpins, salmon, and greenling. Harbor seals have also been known to eat octopus, squid, and shrimp (Imlet and Sarber, 1947; Spalding, 1964).

Beluga (Delphinapterus leucas). The beluga, or white whale, is circumboreal. In the north Pacific region, the beluga ranges from the Gulf of Alaska throughout the Okhotsk and Bering Seas and the Arctic Ocean. The movements and distribution of the belugas in the Gulf of Alaska are generally unknown. Belugas enter estuaries and rivers in summer, or as soon as the ice moves offshore (Klinkhart, 1966).

Although there is little basis for determining the beluga population status in Alaska, the population of belugas in the northwestern Gulf of Alaska has been estimated to be about 350 (Scheffer, 1972; Fiscus, et al., 1976). The overall population has been estimated to be between 32,000 and 58,000 (USDC, 1975).

Belugas feed from midwater to the bottom on fish, such as salmon, smelt, flounder, sole, sculpin, blenny, lamprey, shrimp, mussels, crustaceans, and squid. Belugas are known to move up the mouths of major rivers to feed on emigrating salmon fry. Other food items probably enter the belugas' diet at other times of the year.

Killer Whale (Orcinus orca). The killer whale is the most widely distributed marine mammal in the world inhabiting all oceans and ranging north and south to polar ice (Rice, 1968; Scheffer, 1971). Scheffer (1972) has estimated the population of killer whales in the northwestern Gulf of Alaska to vary from 10 to 100. The Strait of Georgia in British Columbia, Prince William Sound in the Gulf of Alaska, and Puget Sound in Washington State are killer whale concentration areas. Killer whales are found throughout the Gulf of Alaska during summer months and may shift to the south during winter.

Although it has not been possible to establish any orderly pattern of movement or migration (Pike and MacAskie, 1969, as reported by Scheffer, 1972), killer whale migratory habits are probably dependent on food distribution and supply. Their food consists of fish (cod, herring, capelin, flatfish, sardine, salmon, and tuna), squid, octopus, other cetaceans, pinnipeds, and seabirds (Scheffer, 1972; Nishiwaki, 1967; Yablokov, et al., 1972).

Minke Whale (Balaenoptera acutorostrata). The minke (little piked) whale inhabits all oceans of the world except in equatorial regions, ranging into the polar pack ice zones of both hemispheres. Three distinct populations are recognized: north Pacific Ocean, north Atlantic Ocean, and Southern Hemisphere. During summer in the north Pacific, minke whales range from Baja, California (about 20° N. latitude) north along the Pacific Rim into the Bering and Chukchi Seas and down to Kyukyu Islands (Nishiwaki, 1966a). They winter from central California to central Mexico.

Minke whales are relatively common (the most common small whale) in the northern gulf and are known to concentrate in areas of abundant food such as the Kodiak Island and Prince William Sound regions. Forty-three minkes have been observed at 33 locations in the gulf (Calkins, et al., 1975). Fiscus, et al., (1976:27) stated that estimates of abundance for this species were impossible to make due to lack of information. Minke whales, smallest of the baleen whales, feed mostly on euphausiids, but also eat small fish.

Beaked Whales. Three beaked whales inhabit Alaskan waters: Bering Sea beaked whale (Mesoplodon stejnegeri); goose-beaked whale (Ziphius cavirostris); and giant bottlenose whale (Berardius bairdi). All three beaked whales are endemic to the north Pacific. They range from California north to the Gulf of Alaska and Bering Sea around St. Matthew Island and off Japan (Nishiwaki, 1966a; USDC, 1973; Rice, 1971). Seasonal movements and densities are unknown (Fiscus, et al., 1976). They feed mostly on deepwater fish and squid.

Dall Porpoise (Phocoenoides dalli). Dall porpoise, distributed widely in the north Pacific Ocean, range from southern California (about 30° N. latitude) along the Pacific Rim to Japan, including the Bering (to about 62° N. latitude) and Okhotsk Seas (Nishiwaki, 1967). They are probably the most common cetacean seen in the Gulf of Alaska with sightings common both nearshore and offshore.

Although there are no Dall porpoise population estimates for the north Pacific, Scheffer (1972) and Fiscus, et al. (1976) estimated a density of about 2,000 in the Gulf of Alaska. Dall porpoise feed on squid, fish (saury, hake, herring, jack mackerel), and bathypelagic and deepwater benthic fish.

Harbor Porpoise (Phocoena phocoena). Harbor porpoise are found in the north Pacific from southern California to the Beaufort Sea (Point Barrow) on the American side, and along the Siberian coast down to the Sea of Japan on the Asiatic side (Nishiwaki, 1967). Harbor porpoise are the smallest cetacean in the gulf; they generally frequent sheltered bays, mouths of large rivers, harbors, other nearshore waters, and occasionally enter rivers. Their migration pattern is unknown.

Scheffer (1972) and Fiscus, et al. (1976) have estimated the harbor porpoise population in the Gulf of Alaska to be about 1,000. They feed primarily on bottomfish such as cod, herring fry, flounder, and occasionally on invertebrates, such as squid, clams, and crustaceans.

North Pacific White-sided Dolphin (Lagenorhynchus obliquidens). The white-sided dolphin is widely distributed and common in the north Pacific from Panama on the American side north along the Pacific Rim and down to about 20° N. latitude on the Asiatic side.

There have been several sightings of this dolphin in Alaska; there was one from the Valdez region and one from Montague Strait (Miller and Kellogg, 1955, as reported by Scheffer, 1972). In addition, more than 2,000 white-sided dolphins were sighted about 130 miles south of Yakutat, Alaska, by National Marine Fisheries Service pelagic fur seal investigators, and 12 were sighted near the 1800 m isobath off Yakutat Bay (Calkins, et al., 1975). Fiscus, et al. (1976:202) reported a sighting of 17 animals offshore approximately 30 miles southeast of Cape Yakataga. It is reasonable to assume that this species could occur offshore in the proposed sale 55 area.

However, there is little information on the numbers, food habits, and specific migration routes of this species.

Northern Right Whale Dolphin (Lissodelphis borealis). Little is known about the distribution of this oceanic dolphin. Scheffer (1972) has suggested that this species may enter Alaskan waters, and Nishiwaki (1966a) shows its distribution in the Gulf of Alaska. No estimate of their abundance in the Gulf of Alaska is available. Fiscus, et al. (1976:41) estimated the entire north Pacific population at 10,000+ animals. These dolphins have been reported from 30° to 50° N. latitudes in the north Pacific, and have been observed most frequently near the continental slope, sea mounts, and banks. Their diet consists primarily of squid and miscellaneous fish.

Table II.B.4-1
Marine Mammals of the Eastern Gulf of Alaska

	Occurrence				Feeding
Species	Presence	Coastal	Offshore	Density	Behavior
Sea Otter	PR	x		2,3/5,000	Benthos Dem. Fish
Steller Sea Lion	PR	x		2,3/8,500	Fish
Northern Fur Seal	SE		x	3/20,000	Fish
Harbor Seal	PR	x		15,000 - 3/25,000	Fish Crustaceans Molluscs
Gray Whale	SE		x	3/1,100	1/B
Fin Whale	SE		x	3/1,000	1/Ma
Sei Whale	SE	x	x	3/300	1/Ma
Minke Whale	PR	x	x	2/200	1/Ma
Blue Whale	SE		x	3/120	1/Ma
Black Right Whale	SE		x	3/20	1/Mi
Humpback Whale	SE	x	x	3/20	1/Ma
Sperm Whale	SE		x	3/600	1/T
Beluga Whale	PR	x		3/350	1/Bi
Killer Whale	PR	x	x	3/100	1/S/I/T
Bering Sea Beaked Whale	SE		x	3/R	Bi/Ti
Goosebeaked Whale	SE		x	3/R	Bi/Ti
Giant Bottlenose Whale	SE		x	3/R	Bi/Ti
Pilot Whale	SE	x	x	3/R	1/Ti
Dall Porpoise	PR	x	x	3/2,000	1/Bi/Ti
Harbor Porpoise	PR	x		3/1,000	1/Bi
North Pacific White-sided Dolphin	SE		x	3/R	Bi
Northern Right-Whale Dolphin	SE		x	3/R	1/I

Pr - Permanent Resident	Ti - Teuthoichthyophages
Se - Seasonal Entrant	T - Teuthophages
R - Rare	S - Sarcophages
I - Ichthyophages	Mi - Microplanktophages
Bi - Benthoichthyophages	Ma - Macroplanktophages
B - Benthophages	

Sources: 1/ Yabolkov, et al., 1972.
2/ Pitcher & Vania, 1973.
3/ Scheffer, 1972.

GRAPHIC NO. 7

MARINE MAMMALS

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

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nto the Bering and
and down to Kyukyu
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are relatively com-
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t Alaskan waters:
ked whale (Mesoplo-
ri); goose-beaked
s cavirostris); and
se whale (Berardius
three beaked whales
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71). Seasonal move-
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(Phocoenoides dalli).
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bly the most common
in the Gulf of
ghtings common both
offshore.

quent sheltered bays, mouths of large rivers, harbors, other nearshore waters, and occasionally enter rivers. Their migration pattern is unknown.

Scheffer (1972) and Fiscus, et al. (1976) have estimated the harbor porpoise population in the Gulf of Alaska to be about 1,000. They feed primarily on bottomfish such as cod, herring fry, flounder, and occasionally on invertebrates, such as squid, clams, and crustaceans.

North Pacific White-sided Dolphin (Lagenorhynchus obliquidens). The white-sided dolphin is widely distributed and common in the north Pacific from Panama on the American side north along the Pacific Rim and down to about 20° N. latitude on the Asiatic side.

There have been several sightings of this dolphin in Alaska; there was one from the Valdez region and one from Montague Strait (Miller and Kellogg, 1955, as reported by Scheffer, 1972). In addition, more than 2,000 white-sided dolphins were sighted about 130 miles south of Yakutat, Alaska, by National Marine Fisheries Service pelagic fur seal investigators, and 12 were sighted near the 1800 m isobath off Yakutat Bay (Calkins, et al., 1975). Fiscus, et al. (1976:202) reported a sighting of 17 animals offshore approximately 30 miles southeast of Cape Yakataga. It is reasonable to assume that this species could occur offshore in the proposed sale 55 area.

However, there is little information on the numbers, food habits, and specific migration routes of this species.

Northern Right Whale Dolphin (Lissodelphis borealis). Little is known about the distribution of this oceanic dolphin. Scheffer (1972) has suggested that this species may enter Alaskan waters, and Nishiwaki (1966a) shows its distribution in the Gulf of Alaska. No estimate of their abundance in the Gulf of Alaska is available. Fiscus, et al. (1976:41) estimated the entire north Pacific population at 10,000+ animals. These dolphins have been reported from 30° to 50° N. latitudes in the north Pacific, and have been observed most frequently near the continental slope, sea mounts, and banks. Their diet consists primarily of squid and miscellaneous fish.

Table II.B.4-1
Marine Mammals of the Eastern Gulf of Alaska

Species	Occurrence			Density	Feeding Behavior
	Presence	Coastal	Offshore		
Sea Otter	PR	x		2,3/5,000	Benthos Dem. Fish
Steller Sea Lion	PR	x		2,3/8,500	Fish
Northern Fur Seal	SE		x	3/20,000	Fish
Harbor Seal	PR	x		15,000 - 3/25,000	Fish Crustaceans Molluscs
Gray Whale	SE		x	3/1,100	1/B
Fin Whale	SE		x	3/1,000	1/Ma
Sei Whale	SE	x	x	3/300	1/Ma
Minke Whale	PR	x	x	2/200	1/Ma
Blue Whale	SE		x	3/120	1/Ma
Black Right Whale	SE		x	3/20	1/Mi

northern coastal areas of the Pacific Ocean and Bering Sea south to the Kuril Islands and Hokkaido Island on the west and to southern California on the east (Lensink, 1960 and Kenyon, 1969). In the northeastern Gulf of Alaska, sea otters are present from the southern tip of the Kenai Peninsula east to the Prince William Sound region. Further to the east, sea otters occur in the Controller and Yakutat Bay areas. Concentrations of sea otters near the proposed lease area are found in the waters adjacent to Kayak, Hinchinbrook, and Montague Islands (Alaska Dept. of Fish and Game, 1973a; Pitcher & Vania, 1973; Lensink, 1962).

gather on their breeding rookeries in late May. Although these same rookeries are used during winter, some sea lions leave the rookeries during winter months in favor of more protected hauling grounds; e.g., in Prince William Sound (Glacier Island, Perry Island, and Point Eleanor) (Pitcher, 1975). Alaska has 202 known sea lion rookeries; 91 of these are located in the vicinity of the northeast Gulf of Alaska region (Calkins, et al., 1975).

The entire Alaskan sea lion population was estimated at 200,000 (Alaska Dept. of Fish and Game, 1973a). Calkins, et al. (1975) reported a sea lion population estimate of about 95,000 animals.

to November. During the remainder of the year, the immature seals and adult females migrate to favored feeding areas above the continental shelf (generally 10 to 100 miles offshore) from the Bering Sea south along both sides of the Pacific Ocean to about 32° N. latitude. Older and male fur seals generally stay in the northeastern gulf area. By March and April, most of the herd is again in Alaskan waters.

Principal food items of pelagic fur seals in the gulf are walleye pollock, several species of squid, Atka mackerel, and three species of salmon (Anonymous, 1970).

ler Bay regions; and at the mouths of the East Alsek, Akive, Italio, Dangerous, and Situk Rivers. Seals are found throughout Yakutat Bay and are particularly abundant on floating ice from Hubbard Glacier. Icy Bay contains a relatively large concentration of harbor seals. Numerous fiords and shallow water estuaries from Orca Bay and Prince William Sound to the tip of the Kenai Peninsula also provide habitat for harbor seals.

The diet of harbor seals varies according to season and location but generally includes pelagic, demersal, and anadromous fish, cephalopods, and crustaceans. According to Calkins, et al (1975),

months and may shift to the south during winter.

Although it has not been possible to establish any orderly pattern of movement or migration (Pike and MacAskie, 1969, as reported by Scheffer, 1972), killer whale migratory habits are probably dependent on food distribution and supply. Their food consists of fish (cod, herring, capelin, flatfish, sardine, salmon, and tuna), squid, octopus, other cetaceans, pinnipeds, and seabirds (Scheffer, 1972; Nishiwaki, 1967; Yablokov, et al., 1972).

Minke Whale (Balaenoptera acutorostrata). The minke (little piked) whale inhabits all oceans

Although ther
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the north
(1972) and F
estimated a
2,000 in th
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(saury, hake,
kerel), and b
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Harbor porpoi
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Barrow) on th
along the Sib
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se (Phocoena phocoena).
se are found in the
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ıki, 1967). Harbor
the smallest cetacean
they generally fre-

Humpback Whale	SE	x	x	3/20	1/Ma
Sperm Whale	SE		x	3/600	1/T
Beluga Whale	PR	x		3/350	1/Bi
Killer Whale	PR	x	x	3/100	1/S/I/T
Bering Sea Beaked Whale	SE		x	3/R	Bi/Ti
Goosebeaked Whale	SE		x	3/R	Bi/Ti
Giant Bottlenose Whale	SE		x	3/R	Bi/Ti
Pilot Whale	SE	x	x	3/R	1/Ti
Dall Porpoise	PR	x	x	3/2,000	1/Bi/Ti
Harbor Porpoise	PR	x		3/1,000	1/Bi
North Pacific White-sided Dolphin	SE		x	3/R	Bi
Northern Right-Whale Dolphin	SE		x	3/R	1/I

Pr - Permanent Resident
Se - Seasonal Entrant
R - Rare
I - Ichthyophages
Bi - Benthoichthyophages
B - Benthophages
Ti - Teuthoichthyophages
T - Teuthophages
S - Sarcophages
Mi - Microplanktophages
Ma - Macroplanktophages

Sources: 1/ Yabolkov, et al., 1972.
2/ Pitcher & Vania, 1973.
3/ Scheffer, 1972.

#6139005 ID:88076077 TD195.P4 A434 1980 v.2

Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA
Sale No. 55

Bureau of Land Management
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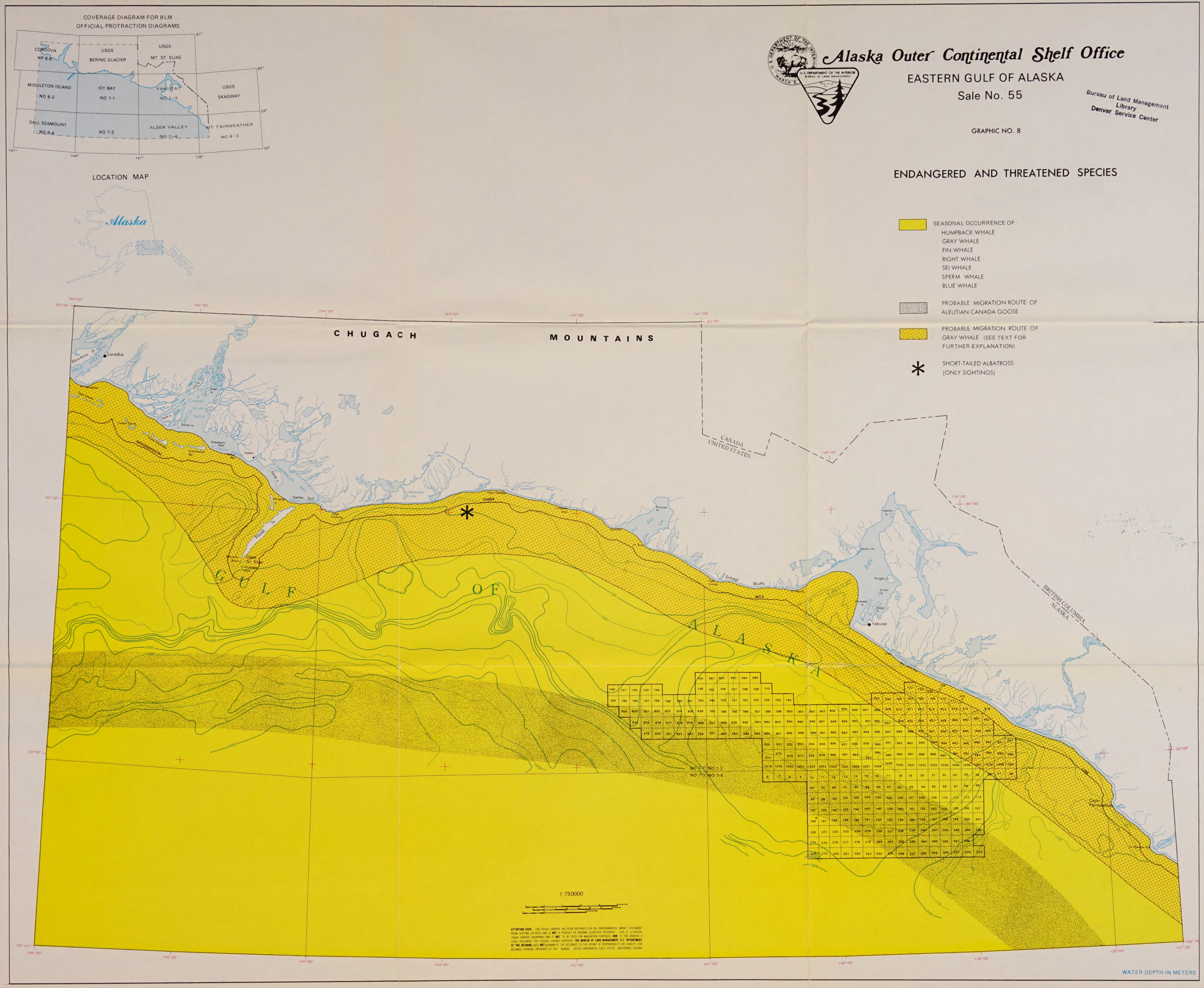
GRAPHIC NO. 8

ENDANGERED AND THREATENED SPECIES



🟨 SEASONAL OCCURRENCE OF:
- HUMPBACK WHALE
- GRAY WHALE
- FIN WHALE
- RIGHT WHALE
- SEI WHALE
- SPERM WHALE
- BLUE WHALE

▨ PROBABLE MIGRATION ROUTE OF ALEUTIAN CANADA GOOSE

▨ PROBABLE MIGRATION ROUTE OF GRAY WHALE (SEE TEXT FOR FURTHER EXPLANATION)

* SHORT-TAILED ALBATROSS (ONLY SIGHTINGS)

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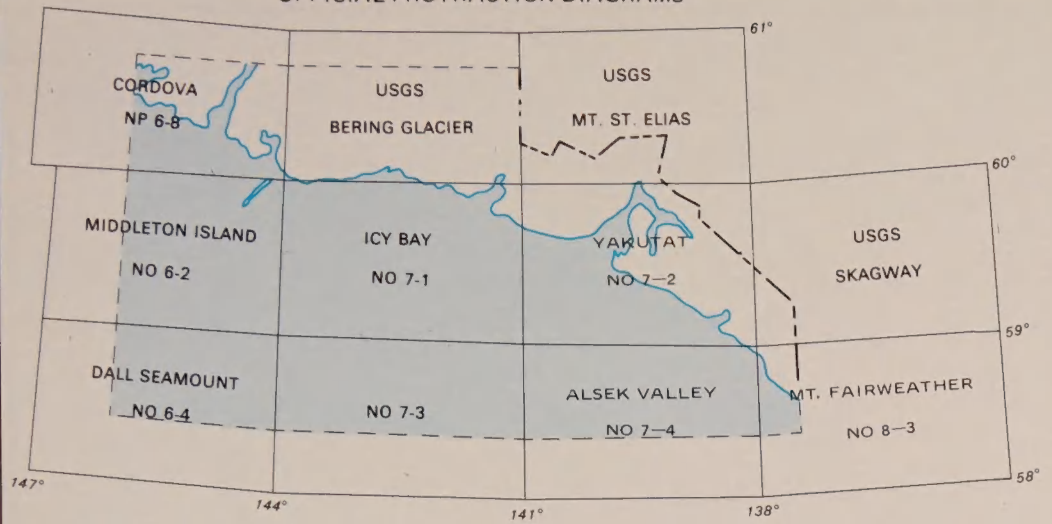
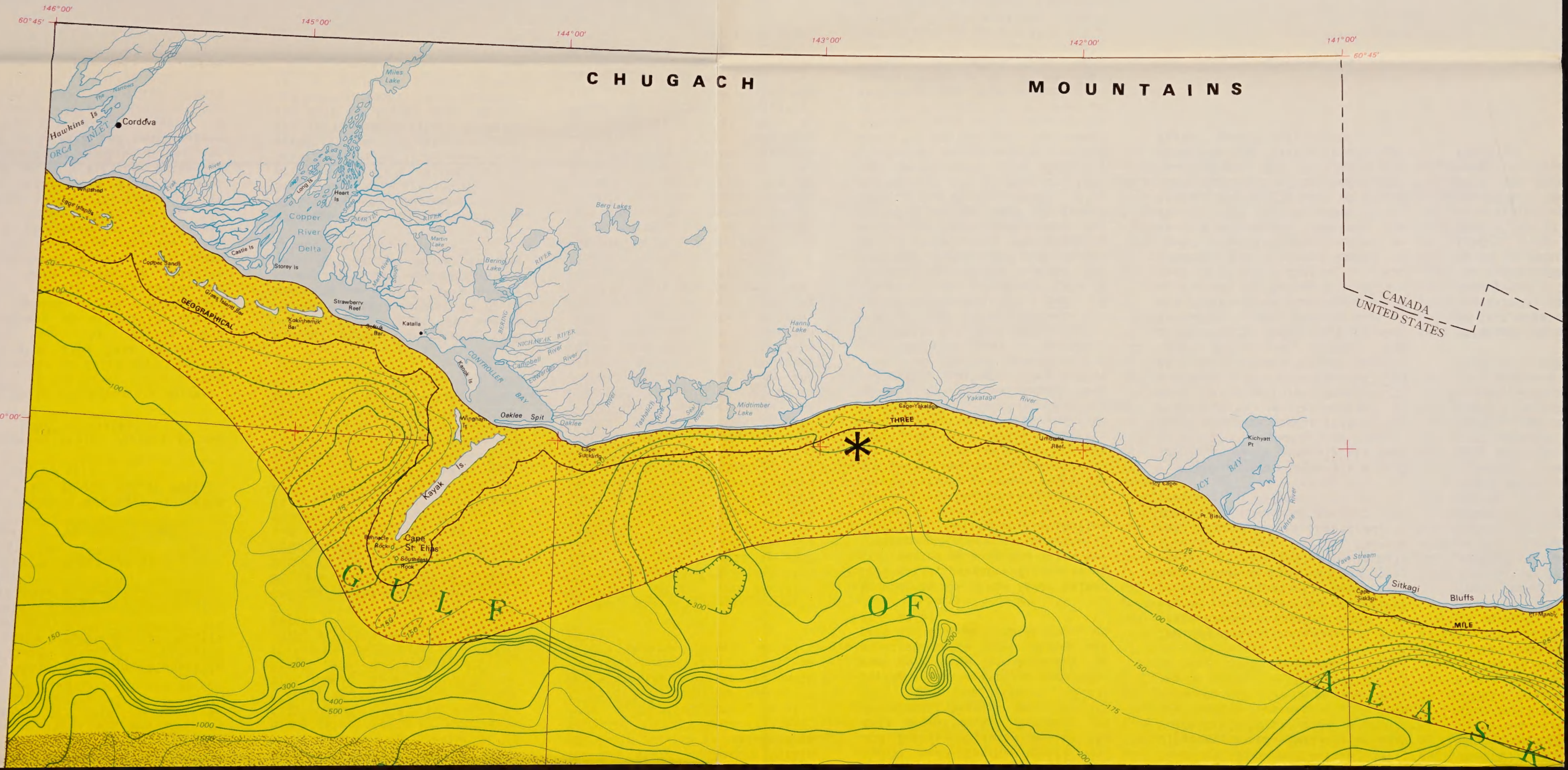
COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



LOCATION MAP



#6139005 ID:88076077 TD195.P4 A434 1980 v.2

Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

Bureau of Land Management
Library
Denver Service Center

GRAPHIC NO. 8

ENDANGERED AND THREATENED SPECIES

🟨 SEASONAL OCCURRENCE OF:
- HUMPBACK WHALE
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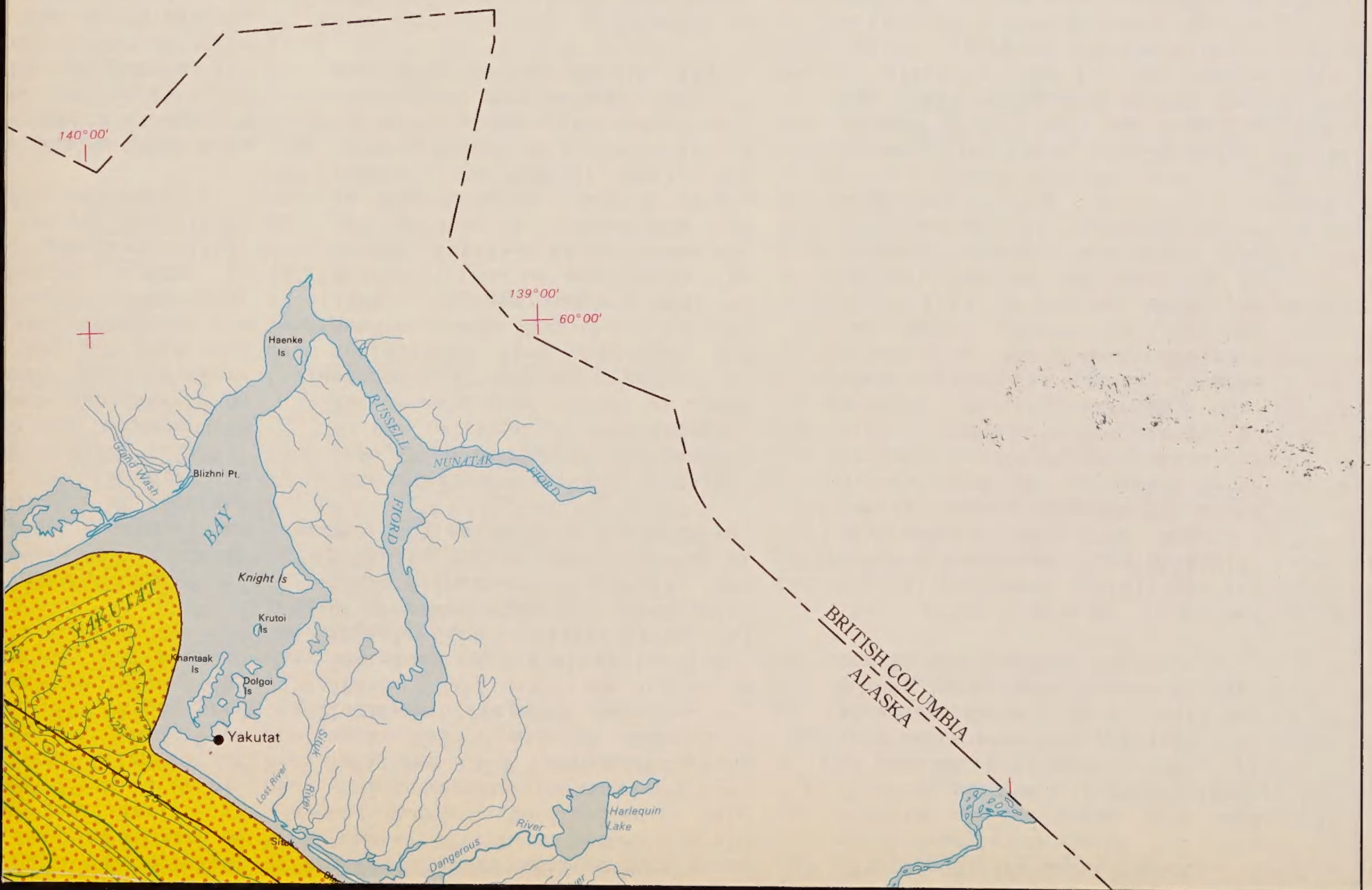
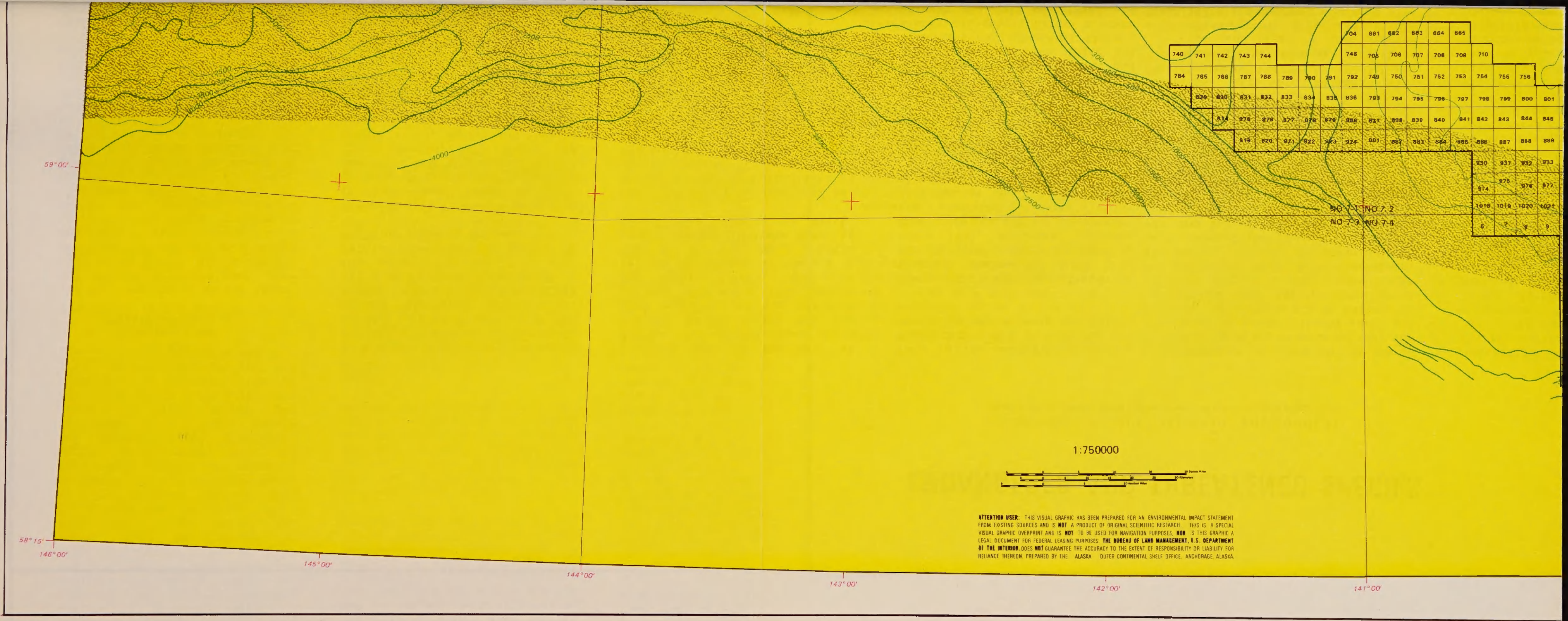
* SHORT-TAILED ALBATROSS (ONLY SIGHTINGS)





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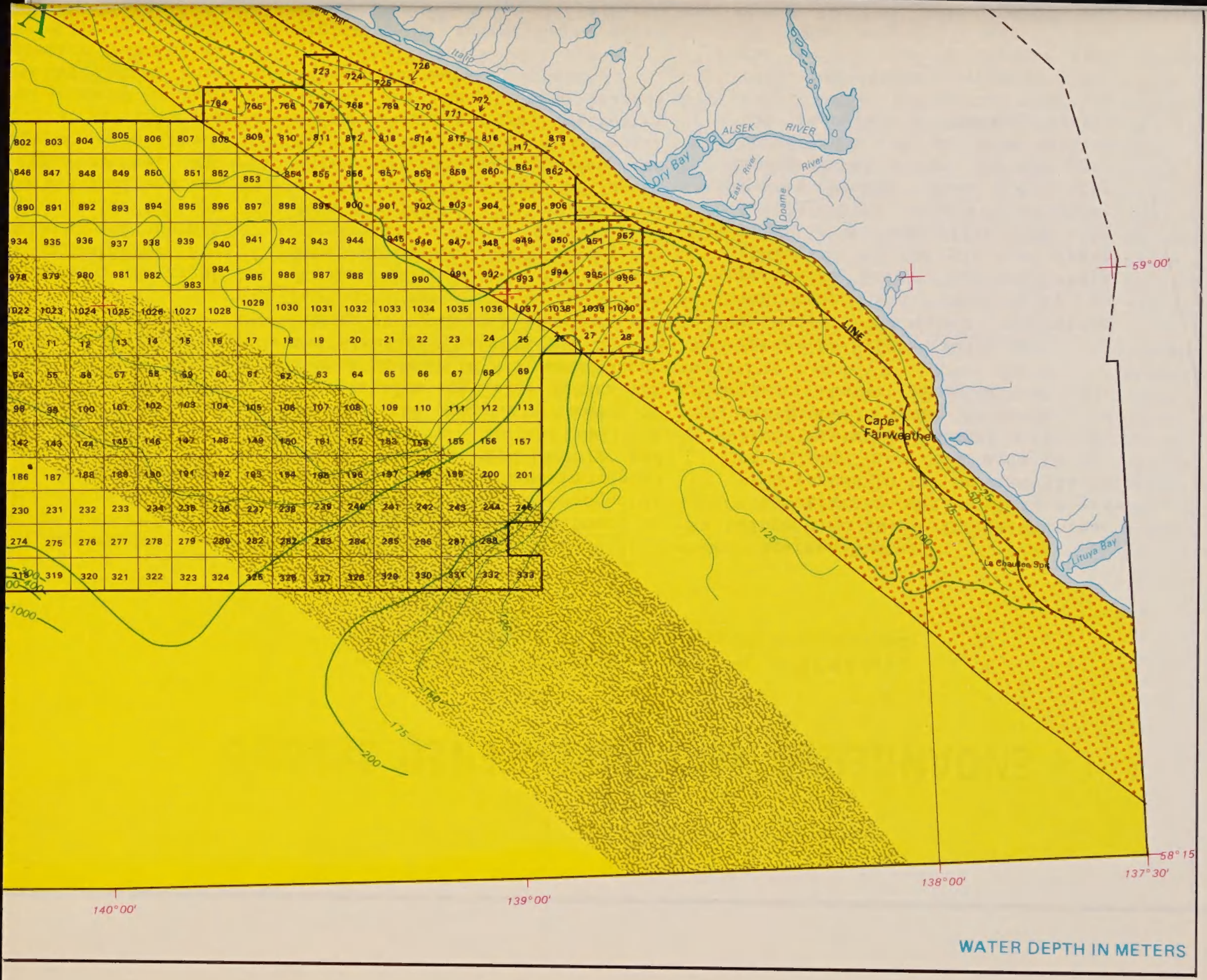
breeding apparently occurs from



WATER DEPTH IN METERS

GRAPHIC NO. 8

ENDANGERED AND THREATENED SPECIES

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of the Biological Characteristics of the Affected Environment

II.B.6.
Endangered and Threatened Species

The U.S. Department of the Interior defines a "threatened" species as an animal not in immediate danger of extinction although its numbers are decreasing and it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. An "endangered" species is an animal or plant which is in immediate danger of extinction throughout all or a significant portion of its range, and for which the Secretary of the Interior has officially declared, via listing in the Federal Register, to be an endangered species.

Those officially designated endangered foreign or native wildlife species occurring in the Gulf of Alaska, as reported in the Federal Register (Vol. 43, No. 238) of December 11, 1978, include the following whales:

Blue whale	Balaenoptera musculus
Fin whale	Balaenoptera physalus
Sei whale	Balaenoptera borealis
Humpback whale	Megaptera novaeangliae
Gray whale	Eschrichtius robustus
Right whale	Eubalaena glacialis
Sperm whale	Physeter catodon

These species are also protected under the Marine Mammal Protection Act of 1972.

Endangered Whales Present in the Gulf of Alaska

Blue Whale (Balaenoptera musculus): In the north Pacific, the blue whale is distributed on the west side from Baja California north to the Bering Sea (Ridgeway, et al., 1972; Berzin and Rovnin, 1966; Nishiwaki, 1972). In its summer range, the blue whale occurs in relative abundance in an area just south of the Aleutian Islands from 160°W longitude to 175°W longitude (Rice, 1974; Berzin and Rovnin, 1966). The blue whale is also distributed from an area north of 50°N latitude extending southeast of Kodiak across the Gulf of Alaska and southeastern Alaska to as far south as Vancouver Island (Berzin and Rovnin, 1966). According to whaling statistics, large concentrations of this species once occurred in the northern part of the Gulf of Alaska southwest of Prince William Sound in the Portlock Banks area (Nishiwaki, 1966), and occurred in an area west of Queen Charlotte Islands and the Alexander Archipelago of southeastern Alaska (Berzin and Rovnin, 1966).

According to Berzin and Rovnin (1966), blue whale spring migration begins April-May as whales travel north along the American shore of the Pacific. Rice (1974) reported that all blue whales seen off California were less than 80 kms from shore and some only 3 kms with many in shallow water between 50 kms and 200 m deep. Whaling records indicate a peak occurrence of blue whales in the Aleutians in June and July for the Gulf of Alaska (Rice, 1974).

Three recent confirmed sightings of the blue whale in the Gulf of Alaska are as follows: on June 24, 1978, 2 separate sightings occurred at 56°23'N latitude and 133°38'W longitude near Snow Passage off southeastern Alaska, and on August 16, 1978, at 55°43'N latitude and 154°54'W longitude east of Chirikof Island; 4 whales were sighted (Consigliari, 1979).

Fall migration of the blue whale begins in September moving south in the reverse direction of the spring migration (Berzin and Rovnin, 1966) to wintering areas off Baja California and south to the equator (Fiscus, et al., 1976). The breeding season of the blue whale is unknown.

The principal food of blue whales in their summer range are small euphausiid crustaceans (Euphausia pacifica, and Thysanoessa spinifera) (Nemoto, 1959; Nemoto and Toshio, 1965; Berzin and Rovnin, 1966; Ridgeway, et al., 1972). Food is obtained by engulfment rather than skimming as some baleen whales do. Thus, they require dense swarms of plankton (Nemoto, 1975; Pivorunas, 1979).

The blue whale population in the north Pacific has been reduced by commercial whaling from an estimated pre-whaling population of 6,000 (Rice, 1974) to 1,600 animals (Wada, 1973, as cited by Fiscus, et al., 1976). Although blue whales have been protected since 1966, no significant recovery has been detected (Tillman, 1975; as cited by Fiscus, et al., 1976).

Fin Whale (Balaenoptera physalus): The fin whale is widely distributed in the northeastern Pacific with the Gulf of Alaska representing a significant portion of its summer feeding range (Fiscus, et al., 1976) with significant numbers occurring during May to August from 144°W to 150°W longitude and 56°N to 59°N latitude to include part of Portlock Bank and from an area near the Shumagin Islands to the Trinity Islands south of Kodiak (Berzin and Rovnin, 1966; Fiscus, et al., 1976).

During spring migration, fin whales first occur in southeastern Alaskan waters in March and peak in April. Peak occurrences in the Kodiak-Northern Gulf of Alaska begin in May (Fiscus, et al., 1976).

Although fall migration of fin whales begins in September in the Bering Sea, this species will remain in the Aleutian and Gulf of Alaska waters until November with possibly some fin whales wintering in the southeastern Aleutian and Gulf of Alaska area (Berzin and Rovnin, 1966). From extrapolation of fetal growth curves, breeding apparently occurs from September through March.

The food sources of fin whales in the north Pacific include euphausiid crustaceans (krill), as well as small fish, especially herring and capelin (Nemoto, 1959; Nemoto and Toshio, 1965; Ridgeway, et al., 1972). Fin whales, like blue whales, feed by engulfment of large swarms or schools of prey (Nemoto, 1959; Pivorumas, 1979).

The population of fin whales in the eastern north Pacific has been estimated at 9,000 animals (Rice, 1974); other estimates of the north Pacific stock range up to 16,000 animals (Ohsumi and Wada, 1974; as cited by Fiscus, et al., 1976). Present abundance of the fin whale in the Gulf of Alaska is unknown.

Sei Whale (Balaenoptera borealis): The sei whale occurs in the Pacific, Atlantic, and Antarctic Oceans (Ridgeway, et al., 1972). In the Gulf of Alaska, the summer distribution of the sei whale is similar to that of the fin whale (Rice, 1974).

A large concentration of this species occurs near and just east of Portlock Bank in the Gulf of Alaska. The largest known concentration occurs during May and June southeast of the Aleutian Islands (Nishiwaki, 1966; Berzin and Rovnin, 1966). Migration periods and routes are similar to that of the fin whale. Fetal growth curves indicate breeding occurs from October to March.

The principal food source of sei whales in the Gulf of Alaska is small copepods (Calanus), which the sei whale catches by skimming the water surface with its fine baleen fringes (Nemoto, 1959; Nemoto and Toshio, 1965; Pivorunas, 1979). Other food sources in the north Pacific include euphausiid crustaceans and small fish such as herring, sandlance, and pollock (Ridgeway, 1972).

The sei whale population within the north Pacific is estimated to be about 8,600 animals (Tillman, 1976, as cited by Fiscus, et al., 1976). Prewhaling estimates of sei whale abundance in the north Pacific range from 40,000 to 42,000 animals (Fiscus et al., 1976).

Humpback Whales (Megaptera novaeangliae): In the north Pacific, the humpback whale is distributed from the equator, north to 70°N latitude in the Chukchi Sea (Ridgeway, et al., 1972; Rice, 1974). The summer range of the American population extends along the coast from Vancouver Island northward to the southern part of the Chukchi Sea (Berzin and Rovnin, 1966). In the Gulf of Alaska, humpback whales concentrate in 3 regions: (1) the Portlock and Albatross Banks to south of Kodiak including the eastern Aleutians; (2) Montague Strait and the Prince William Sound area; and (3) the inland waters of southeastern Alaska, Stephen's Passage, and Frederick Sound (Berzin and Rovnin, 1966; Fiscus, et al., 1976; Mercer, Braham, and Fiscus, 1977). In the Kodiak sale area, relatively large concentrations of humpbacks have been sighted between Shuyak Islands and the Barren Islands and between Kodiak Island and the Trinity Islands (Calkins and Curatolo, 1979; Calkins, personal communication, 1979). Humpbacks have been sighted as early as March off Alexander Archipelago with peak occurrences during May for the Kodiak Portlock and Albatross Banks area and Prince William Sound (Fiscus, et al., 1976; Mercer, Braham, and Fiscus, 1977).

Fall migration may begin as early as September (Berzin and Rovnin, 1966; Ridgeway, et al., 1972) from northern waters in the Bering, but southward migration out of the Gulf of Alaska and Kodiak area usually starts in December to wintering grounds off Mexico and the Hawaiian Archipelago (Fiscus, et al., 1976). Berzin and Rovnin (1966) and Hall and Tillman (1977) suggest that some humpbacks may remain in the Gulf of Alaska during mild winters as indicated by occasional winter sightings. The northward migration of this species occurs in early March (Wolman, 1972; Fiscus, et al., 1976). Fetal growth curves indicate breeding occurs from October through April.

The humpback whale feeds on euphausiids (krill) and sometimes small fish such as herring and cod (Nemoto, 1959; Nemoto and Toshio, 1965; Wolman, 1978). According to Wolman (1972) evidence indicates that humpback whales, like gray, blue and fin whales, are seasonal feeders, obtaining food in the northern or summer range and living on body fat reserves in the calving and winter range.

The north Pacific population of humpback whales has been protected from commercial whaling since 1966. Evidence indicates that this population is increasing, with the estimated population now at about 1,400 animals (Fiscus, et al., 1976).

Gray Whale (Eschrichtius robustus): The gray whale occurs only in the north Pacific and adjacent waters of the Arctic Ocean (Rice and Wolman, 1971). The primary summer range of this species is in the Bering Sea, Chukchi Sea, and western Beaufort Sea (Rice and Wolman, 1971). The east Pacific stock of gray whales migrate through the Gulf of Alaska and Kodiak area during April, May, and June, and again during the fall migration in November and December (Berzin and Rovnin, 1966; Rice and Wolman, 1971). During peak migration periods, such as mid- to late-December, an expected 5,000 gray whales may pass the Kodiak area (Fiscus, et al., 1976).

According to Rice and Wolman (1971:127), southward migrating gray whales swim within a few kilometers offshore until reaching southern California. During northward migration, there is evidence that females with calves travel farther offshore, with the remainder following essentially the same route as taken in the fall. Nemoto (1964) suggests that gray whales do migrate through narrow straits between islands and the mainland. When migrating through the Kodiak area, this species apparently follows the east coast of the Kenai Peninsula and then turns southwest at the Barren Islands and moves along the east coast of Afognak and Kodiak Islands (Cunningham, 1979). Like the humpback whale, some gray whales may overwinter in the southern portion of their summer range and possibly in the Gulf of Alaska (Berzin and Rovnin, 1966). Rice and Wolman (1971) mention that some gray whales stop short of the arctic on northern migrations and a few whales spend the summer feeding season in southern Alaska waters. Graphic No. 8 shows an arbitrary zone from nearshore to approximately 15 mi (27 km) offshore representing an area through which it is most probable that migrating gray whales would travel. Little empirical information exists to verify that gray whale migration is restricted to this zone in the Gulf of Alaska. However, it is evident that this species characteristically migrates close to shore in the southern portion of its range. For example, 95 percent of the entire gray whale population was estimated to travel within 1.9 km of shore at certain points along the California coast (Rice and Wolman, 1971:110). It can be assumed that the migration behavior of animals in the Gulf of Alaska approximate that observed to the south, and therefore, a most probable estimate of the Gulf of Alaska migration corridor is illustrated as shown on Graphic No. 8. Fiscus et al. (1976:25) suggested that resident gray whale individuals may occur year-round in the Gulf of Alaska. Thus, this species may occur throughout the proposed sale area with most likely seasonal occurrence in nearshore tracts.

The gray whale, like the humpback, blue, and fin whales, is apparently a summer range feeder, building up blubber layers from the abundance of food in the north and migrating to warm calving and breeding grounds in the south during the winter, and living on stored body fat reserves until they return to the summer range (Gilmore, 1959; Rice and Wolman, 1971). Little, if any, food is consumed during migration (Rice and Wolman, 1971:127). Breeding and calving occurs off Baja California, during the winter season (Gilmore, 1959; Rice and Wolman, 1971).

Unlike other baleen whales, the gray whale is a bottom feeder with benthic amphipod crustaceans as its preferred food (Nemoto, 1959; Rice and Wolman, 1971; Pivorunas, 1979). Polychaete worms and molluscs are other benthic food items of this species according to Rice and Wolman (1971). Schooling fish may also be eaten (Rice and Wolman, 1971; Ridgeway, et al. 1972). The gray whale feeds by stirring or engulfing bottom sediments and then skimming or filtering the food items (Nemoto, 1959; Rice and Wolman, 1971; Pivorunas, 1979).

The population estimate of gray whales varies significantly between researchers at different geographic locations. A more recent estimate places the gray whale at about 11,000 animals (Rice and Wolman, 1971). The number of gray whales that occur in the Gulf of Alaska has not been reported.

Right Whale (Eubalaena glacialis): This species is probably the most rare of the endangered whales. Three separate populations of the right whale are recognized by most investigators: the north Atlantic, the north Pacific, and the Southern Hemisphere populations (Pivorunas, 1979). The north Pacific population is distributed on the western side of the Pacific from California north as far as the Bering Straits according to early whaling records; however, the northern extent of their range is considered to be the southeastern Bering Sea (Berzin and Rovnin, 1966; Rice, 1974). The entire Gulf of Alaska from Vancouver Island-Alexander Archipelago to the eastern Aleutians is within the right whales' summer range and historically encompasses the "best" whaling grounds in the nineteenth century for this species (Rice, 1974; Fiscus, et al., 1976). In the north Pacific, the area of greatest seasonal utilization by right whales is the northern Gulf of Alaska between 145° to 151°W longitude south to about 50°N latitude (Berzin and Rovnin, 1966).

The route and timing of right whale migration is unknown. According to Berzin and Rovnin (1966) the right whales of the north Pacific do not follow a restricted migration route, but move north along a broad front. Whaling records indicate this species should be present in the Gulf of Alaska and Kodiak area from May to September (Fiscus, et al., 1976). There are no records of recent confirmed sightings in the Gulf of Alaska. Three right whales were taken by Japan on Albatross Bank near Kodiak in 1961 for research (Fiscus, et al., 1976). A confirmed sighting of the right whale off Hawaii occurred in March 1979 (Rice, personal communication, 1979). The breeding season of this species is unknown.

The primary food source of Pacific right whales is small copepod crustaceans (Calanus) and small euphausiid crustaceans (Omura, et al., 1969; Watkins and Schevill, 1976; Pivorunas, 1979). Unlike most baleen whales, the right whale feeds exclusively on plankton (Nemoto, 1959) by skimming the water surface over discrete patches of plankton on the surface and subsurface concentrations of plankton within 10 meters depth (Nemoto, 1959; Watkins and Schevill, 1976; Pivorunas, 1979).

Although right whales have been protected from commercial whaling since 1937, this species is still endangered. The population for the entire north Pacific is estimated at about 150 to 200 animals (Wada, 1973, 1975, as cited by Fiscus, et al., 1976). The latter figure is probably an overestimation. Rice (1979) suggests that the species may be on the verge of extinction in the North Pacific.

Sperm Whale (Physeter catodon): The sperm whale is distributed in the Pacific from the equator north to the Cape Navarin region in the Bering Sea (Berzin and Rovnin, 1966). In the Gulf of Alaska, the greatest number of sperm whales regularly occurs off Kodiak Island to the west along the Aleutian Chain as far as the Commander Islands (Berzin and Rovnin, 1966), south of Kodiak Island, and just east of Portlock Bank to about 146°W longitude (Nishiwaki, 1966; Berzin and Rovnin, 1966). The regions of highest concentration of sperm whales are generally associated with a sharp increase in water depth such as the underwater slopes off the Aleutian Islands (Berzin and Rovnin, 1966).

Migration of sperm whales north to Alaskan waters begins in March and continues through May along several migration routes (Berzin and Rovnin, 1966). Mature male whales migrate to more northern latitudes, but females and young males seldom migrate above 50°N latitude (Berzin and Rovnin, 1966). Fall migration begins in September with most whales leaving the Gulf of Alaska by the end of November (Berzin and Rovnin, 1966; Fiscus, et al., 1976). The breeding season and location of breeding and calving are unknown.

Like other whales, the distribution of sperm whales is dependent on the location of food sources. The primary food source of sperm whales is several species of squid and fish (Okutani and Nemoto, 1964; Berzin and Rovnin, 1966). In the eastern Gulf of Alaska, fish is apparently the predominant food of sperm whales, and squid is the predominant food in the Aleutian coastal waters (Okutani and Nemoto, 1964). The feeding method of sperm whales is unknown; however, evidence indicates this species may feed off the ocean bottom (Heezin, 1957).

The north Pacific population of male sperm whales has been estimated at about 90,000 animals (Fiscus, et al., 1976). Although the total population of both sexes combined is believed to be about 150,000 animals, an estimate for the Gulf of Alaska has not been reported.

Migration Routes

Since relatively little information exists to define whale migration routes in the Gulf of Alaska, no attempt has been made to depict migration patterns except the probable route shown for the gray whale (Graphic No. 8).

Peregrine Falcon (Falco peregrinus): Published literature indicates that essentially no peregrine falcon habitat exists shoreward of the proposed lease area. An exception is the Yakutat Bay. However, if peregrines should occur there, the northernmost border of the proposed lease area would be outside the peregrine's hunting territory. The literature further cites additional peregrine habitat much further south and east of the proposed lease area.

Aleutian Canada Goose (Branta canadensis leucopareia): The Aleutian Canada geese once bred from the eastern Aleutian Islands to the Kuril Islands. Today the only known breeding population of Aleutian Canada geese utilizes Buldir Island and appears to winter in California.

The precise migration route and overall use areas of this species are still unknown. The possibility exists that the Aleutian Canada geese migration route passes over the proposed lease area and a probable migration corridor is shown on Graphic No. 8. However, it is questionable whether the oil and gas development would interfere with the migrating geese since the proposed lease area is outside their potential feeding habitat. It is unknown whether migrants stop near or in the proposed lease area.

Short-tailed Albatross (Diomedea immutabilis): Only one sighting has been recorded from the Gulf of Alaska region for the short-tailed albatross. The short-tailed albatross is not a regular visitor to the area. Because of its unusual occurrence, no biological assessment has been made.

FOOD MATRIX – WHALES

TABLE II.B.6.-1.

		FOOD SPECIES																										
		Gray Whale	Minke Whale	Other Cetaceans	Pinnipeds	Porpoise	Birds	Alaska Pollock	Anchovies - Engraulidae Spp.	Atka Mackerel	Boarfish	Capelin	Cisco	Cod	Cuttlefish	Herring	Lantern fish	Pike	Rag-fish	Rockfish	Salmon	Sand lance	Sardines	Saury	Sea lamprey	Smelt	Tuna	Whiting
ENDANGERED WHALES	Blue Whale																											
	Fin Whale							●	●	●		●		●		●	●							●				
	Gray Whale																									●		
	Humpback Whale							●	●	●		●				●						●	●					
	Pacific Right Whale																											
	Sei Whale								●		●	●		●		●								●				
	Sperm Whale														●				●						●			
OTHERS	Baird's Whale															●				●								
	Beluga Whale											●	●	●				●			●							
	Goosebeak Whale																											
	Killer Whale	●	●	●	●	●	●					●		●		●					●		●				●	●
	Minke Whale											●		●		●												

		FOOD SPECIES																																			
		Acanthostepheia malmgreni	Ampelisca macrocephala	Anonyx	Atylus bruggeni	Calanus cristatus	Calanus finmardicus	Calanus plumchrus	Calanus tonsus	Copepoda	Crayfish	Crustaceans	Diastylis bidentata	Dulichia knipowitschi	Euphausia pacifica	Euphausiids	Hippomedon abyssi	Hippomedon minusculus	Holothuroidea	Ischyrocerus latipes	Meganyctiphanes	Metridia lucens	Nereid Worms	Octopus	Orchomene minuta	Paraphoxus milleri	Phallusia	Pleustes	Polychaetes	Protomedeia grandimana	Salpa	Squid	Thysanoessa inermis	Thysanoessa longipes	Thysanoessa raschii	Thysanoessa spinifera	Eel grass-Zostera Spp.
ENDANGERED WHALES	Blue Whale							●							●						●												●	●		●	
	Fin Whale					●		●	●		●				●							●										●	●	●	●	●	
	Gray Whale	●	●	●	●								●	●			●	●	●	●					●	●	●	●	●	●	●						●
	Humpback Whale							●							●																	●	●	●		●	
	Pacific Right Whale					●	●	●							●																			●			
	Sei Whale					●		●			●																					●	●	●			
	Sperm Whale																							●								●					
OTHERS	Baird's Whale																							●								●					
	Beluga Whale															●							●									●					
	Goosebeak Whale											●																				●					
	Killer Whale																							●								●					
	Minke Whale									●																											

Source: Prepared by Alaska OCS Office, 1979.

GRAPHIC NO. 8

ENDANGERED AND THREATENED SPECIES

DESCRIPTION OF THE AFFECTED ENVIRONMENT
Description of the Biological Characteristics of the Affected Environment

II.B.6.
Endangered and Threatened Species

The U.S. Department of the Interior defines a "threatened" species as an animal not in immediate danger of extinction although its numbers are decreasing and it is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. An "endangered" species is an animal or plant which is in immediate danger of extinction throughout all or a significant portion of its range, and for which the Secretary of the Interior has officially declared, via listing in the Federal Register, to be an endangered species.

Those officially designated endangered foreign or native wildlife species occurring in the Gulf of Alaska, as reported in the Federal Register (Vol. 43, No. 238) of December 11, 1978, include the following whales:

Blue whale	Balaenoptera musculus
Fin whale	Balaenoptera physalus
Sei whale	Balaenoptera borealis
Humpback whale	Megaptera novaeangliae
Gray whale	Eschrichtius robustus
Right whale	Eubalaena glacialis
Sperm whale	Physeter catodon

These species are also protected under the Marine Mammal Protection Act of 1972.

Endangered Whales Present in the Gulf of Alaska

Blue Whale (Balaenoptera musculus): In the north Pacific, the blue whale is distributed on the west side from Baja California north to the Bering Sea (Ridgeway, et al., 1972; Berzin and Rovnin, 1966; Nishiwaki, 1972). In its summer range, the blue whale occurs in relative abundance in an area just south of the Aleutian Islands from 160°W longitude to 175°W longitude (Rice, 1974; Berzin and Rovnin, 1966). The blue whale is also distributed from an area north of 50°N latitude extending southeast of Kodiak across the Gulf of Alaska and southeastern Alaska to as far south as Vancouver Island (Berzin and Rovnin, 1966). According to whaling statistics, large concentra-

Fall migration of the blue whale begins in September moving south in the reverse direction of the spring migration (Berzin and Rovnin, 1966) to wintering areas off Baja California and south to the equator (Fiscus, et al., 1976). The breeding season of the blue whale is unknown.

The principal food of blue whales in their summer range are small euphausiid crustaceans (Euphausia pacifica, and Thysanoessa spinifera) (Nemoto, 1959; Nemoto and Toshio, 1965; Berzin and Rovnin, 1966; Ridgeway, et al., 1972). Food is obtained by engulfment rather than skimming as some baleen whales do. Thus, they require dense swarms of plankton (Nemoto, 1975; Pivorunas, 1979).

The blue whale population in the north Pacific has been reduced by commercial whaling from an estimated pre-whaling population of 6,000 (Rice, 1974) to 1,600 animals (Wada, 1973, as cited by Fiscus, et al., 1976). Although blue whales have been protected since 1966, no significant recovery has been detected (Tillman, 1975; as cited by Fiscus, et al., 1976).

Fin Whale (Balaenoptera physalus): The fin whale is widely distributed in the northeastern Pacific with the Gulf of Alaska representing a significant portion of its summer feeding range (Fiscus, et al., 1976) with significant numbers occurring during May to August from 144°W to 150°W longitude and 56°N to 59°N latitude to include part of Portlock Bank and from an area near the Shumagin Islands to the Trinity Islands south of Kodiak (Berzin and Rovnin, 1966; Fiscus, et al., 1976).

During spring migration, fin whales first occur in southeastern Alaskan waters in March and peak in April. Peak occurrences in the Kodiak-Northern Gulf of Alaska begin in May (Fiscus, et al., 1976).

Although fall migration of fin whales begins in September in the Bering Sea, this species will remain in the Aleutian and Gulf of Alaska waters until November with possibly some fin whales wintering in the southeastern Aleutian and Gulf of Alaska area (Berzin and Rovnin, 1966). From extrapolation of fetal growth curves, breeding apparently occurs from

Portlock Bank in the Gulf of Alaska. The largest known concentration occurs during May and June southeast of the Aleutian Islands (Nishiwaki, 1966; Berzin and Rovnin, 1966). Migration periods and routes are similar to that of the fin whale. Fetal growth curves indicate breeding occurs from October to March.

The principal food source of sei whales in the Gulf of Alaska is small copepods (Calanus), which the sei whale catches by skimming the water surface with its fine baleen fringes (Nemoto, 1959; Nemoto and Toshio, 1965; Pivorunas, 1979). Other food sources in the north Pacific include euphausiid crustaceans and small fish such as herring, sandlance, and pollock (Ridgeway, 1972).

The sei whale population within the north Pacific is estimated to be about 8,600 animals (Tillman, 1976, as cited by Fiscus, et al., 1976). Prewhaling estimates of sei whale abundance in the north Pacific range from 40,000 to 42,000 animals (Fiscus et al., 1976).

Humpback Whales (Megaptera novaeangliae): In the north Pacific, the humpback whale is distributed from the equator, north to 70°N latitude in the Chukchi Sea (Ridgeway, et al., 1972; Rice, 1974). The summer range of the American population extends along the coast from Vancouver Island northward to the southern part of the Chukchi Sea (Berzin and Rovnin, 1966). In the Gulf of Alaska, humpback whales concentrate in 3 regions: (1) the Portlock and Albatross Banks to south of Kodiak including the eastern Aleutians; (2) Montague Strait and the Prince William Sound area; and (3) the inland waters of southeastern Alaska, Stephen's Passage, and Frederick Sound (Berzin and Rovnin, 1966; Fiscus, et al., 1976; Mercer, Braham, and Fiscus, 1977). In the Kodiak sale area, relatively large concentrations of humpbacks have been sighted between Shuyak Islands and the Barren Islands and between Kodiak Island and the Trinity Islands (Calkins and Curatolo, 1979; Calkins, personal communication, 1979). Humpbacks have been sighted as early as March off Alexander Archipelago with peak occurrences during May for the Kodiak Portlock and Alba-

food in the northern or summer range and living on body fat reserves in the calving and winter range.

The north Pacific population of humpback whales has been protected from commercial whaling since 1966. Evidence indicates that this population is increasing, with the estimated population now at about 1,400 animals (Fiscus, et al., 1976).

Gray Whale (Eschrichtius robustus): The gray whale occurs only in the north Pacific and adjacent waters of the Arctic Ocean (Rice and Wolman, 1971). The primary summer range of this species is in the Bering Sea, Chukchi Sea, and western Beaufort Sea (Rice and Wolman, 1971). The east Pacific stock of gray whales migrate through the Gulf of Alaska and Kodiak area during April, May, and June, and again during the fall migration in November and December (Berzin and Rovnin, 1966; Rice and Wolman, 1971). During peak migration periods, such as mid- to late-December, an expected 5,000 gray whales may pass the Kodiak area (Fiscus, et al., 1976).

According to Rice and Wolman (1971:127), southward migrating gray whales swim within a few kilometers offshore until reaching southern California. During northward migration, there is evidence that females with calves travel farther offshore, with the remainder following essentially the same route as taken in the fall. Nemoto (1964) suggests that gray whales do migrate through narrow straits between islands and the mainland. When migrating through the Kodiak area, this species apparently follows the east coast of the Kenai Peninsula and then turns southwest at the Barren Islands and moves along the east coast of Afognak and Kodiak Islands (Cunningham, 1979). Like the humpback whale, some gray whales may overwinter in the southern portion of their summer range and possibly in the Gulf of Alaska (Berzin and Rovnin, 1966). Rice and Wolman (1971) mention that some gray whales stop short of the arctic on northern migrations and a few whales spend the summer feeding season in southern Alaska waters. Graphic No. 8 shows an arbitrary zone from nearshore to approximately 15 mi (27 km) off-

abundance of food in the north and migrating to warm calving and breeding grounds in the south during the winter, and living on stored body fat reserves until they return to the summer range (Gilmore, 1959; Rice and Wolman, 1971). Little, if any, food is consumed during migration (Rice and Wolman, 1971:127). Breeding and calving occurs off Baja California, during the winter season (Gilmore, 1959; Rice and Wolman, 1971).

Unlike other baleen whales, the gray whale is a bottom feeder with benthic amphipod crustaceans as its preferred food (Nemoto, 1959; Rice and Wolman, 1971; Pivorunas, 1979). Polychaete worms and molluscs are other benthic food items of this species according to Rice and Wolman (1971). Schooling fish may also be eaten (Rice and Wolman, 1971; Ridgeway, et al. 1972). The gray whale feeds by stirring or engulfing bottom sediments and then skimming or filtering the food items (Nemoto, 1959; Rice and Wolman, 1971; Pivorunas, 1979).

The population estimate of gray whales varies significantly between researchers at different geographic locations. A more recent estimate places the gray whale at about 11,000 animals (Rice and Wolman, 1971). The number of gray whales that occur in the Gulf of Alaska has not been reported.

Right Whale (Eubalaena glacialis): This species is probably the most rare of the endangered whales. Three separate populations of the right whale are recognized by most investigators: the north Atlantic, the north Pacific, and the Southern Hemisphere populations (Pivorunas, 1979). The north Pacific population is distributed on the western side of the Pacific from California north as far as the Bering Straits according to early whaling records; however, the northern extent of their range is considered to be the southeastern Bering Sea (Berzin and Rovnin, 1966; Rice, 1974). The entire Gulf of Alaska from Vancouver Island-Alexander Archipelago to the eastern Aleutians is within the right whales' summer range

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Migration Routes

Since relatively little information exists to define whale migration routes in the Gulf of Alaska, no attempt has been made to depict migration patterns except the probable route shown for the gray whale (Graphic No. 8).

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Aleutian Canada Goose (*Branta canadensis leucopareia*): The Aleutian Canada geese once bred from the eastern Aleutian Islands to the Kuril Islands. Today the only known breeding population of Aleutian Canada geese utilizes Buldir Island and appears to winter in California.

The precise migration route and overall use areas of this species are still unknown. The possibility exists that the Aleutian Canada geese migration route passes over the proposed lease area and a probable migration corridor is shown on Graphic No. 8. However, it is questionable whether the oil and gas development would interfere with the migrating geese since the proposed lease area is outside their potential feeding habitat. It is unknown whether migrants stop near or in the proposed lease area.

Short-tailed Albatross (*Diomedea immutabilis*): Only one sighting has been recorded from the Gulf of Alaska region for the short-tailed albatross. The short-tailed albatross is not a regular visitor to the area. Because of its unusual occurrence, no biological assessment has been made.

curred in the northern part of the Gulf of Alaska southwest of Prince William Sound in the Portlock Banks area (Nishiwaki, 1966), and occurred in an area west of Queen Charlotte Islands and the Alexander Archipelago of southeastern Alaska (Berzin and Rovnin, 1966).

According to Berzin and Rovnin (1966), blue whale spring migration begins April-May as whales travel north along the American shore of the Pacific. Rice (1974) reported that all blue whales seen off California were less than 80 kms from shore and some only 3 kms with many in shallow water between 50 kms and 200 m deep. Whaling records indicate a peak occurrence of blue whales in the Aleutians in June and July for the Gulf of Alaska (Rice, 1974).

Three recent confirmed sightings of the blue whale in the Gulf of Alaska are as follows: on June 24, 1978, 2 separate sightings occurred at 56°23'N latitude and 133°38'W longitude near Snow Passage off southeastern Alaska, and on August 16, 1978, at 55°43'N latitude and 154°54'W longitude east of Chirikof Island; 4 whales were sighted (Consigliari, 1979).

September through March.

The food sources of fin whales in the north Pacific include euphausiid crustaceans (krill), as well as small fish, especially herring and capelin (Nemoto, 1959; Nemoto and Toshio, 1965; Ridgeway, et al., 1972). Fin whales, like blue whales, feed by engulfment of large swarms or schools of prey (Nemoto, 1959; Pivorumas, 1979).

The population of fin whales in the eastern north Pacific has been estimated at 9,000 animals (Rice, 1974); other estimates of the north Pacific stock range up to 16,000 animals (Ohsumi and Wada, 1974; as cited by Fiscus, et al., 1976). Present abundance of the fin whale in the Gulf of Alaska is unknown.

Sei Whale (Balaenoptera borealis): The sei whale occurs in the Pacific, Atlantic, and Antarctic Oceans (Ridgeway, et al., 1972). In the Gulf of Alaska, the summer distribution of the sei whale is similar to that of the fin whale (Rice, 1974).

A large concentration of this species occurs near and just east of

William Sound (Fiscus, et al., 1976; Mercer, Braham, and Fiscus, 1977).

Fall migration may begin as early as September (Berzin and Rovnin, 1966; Ridgeway, et al., 1972) from northern waters in the Bering, but southward migration out of the Gulf of Alaska and Kodiak area usually starts in December to wintering grounds off Mexico and the Hawaiian Archipelago (Fiscus, et al., 1976). Berzin and Rovnin (1966) and Hall and Tillman (1977) suggest that some humpbacks may remain in the Gulf of Alaska during mild winters as indicated by occasional winter sightings. The northward migration of this species occurs in early March (Wolman, 1972; Fiscus, et al., 1976). Fetal growth curves indicate breeding occurs from October through April.

The humpback whale feeds on euphausiids (krill) and sometimes small fish such as herring and cod (Nemoto, 1959; Nemoto and Toshio, 1965; Wolman, 1978). According to Wolman (1972) evidence indicates that humpback whales, like gray, blue and fin whales, are seasonal feeders, obtaining

through which it is most probable that migrating gray whales would travel. Little empirical information exists to verify that gray whale migration is restricted to this zone in the Gulf of Alaska. However, it is evident that this species characteristically migrates close to shore in the southern portion of its range. For example, 95 percent of the entire gray whale population was estimated to travel within 1.9 km of shore at certain points along the California coast (Rice and Wolman, 1971:110). It can be assumed that the migration behavior of animals in the Gulf of Alaska approximate that observed to the south, and therefore, a most probable estimate of the Gulf of Alaska migration corridor is illustrated as shown on Graphic No. 8. Fiscus et al. (1976:25) suggested that resident gray whale individuals may occur year-round in the Gulf of Alaska. Thus, this species may occur throughout the proposed sale area with most likely seasonal occurrence in nearshore tracts.

The gray whale, like the humpback, blue, and fin whales, is apparently a summer range feeder, building up blubber layers from the

		Gray Whale	Minke Whale	Other Cetaceans	Pinnipeds	Porpoise	Birds	Alaska Pollock	Anchovies - Engraulidae Spp.	Atka Mackerel
ENDANGERED WHALES	Blue Whale									
	Fin Whale							●	●	●
	Gray Whale									
	Humpback Whale							●	●	●
	Pacific Right Whale									
	Sei Whale								●	
	Sperm Whale									
OTHERS	Baird's Whale									
	Beluga Whale									
	Goosebeak Whale									
	Killer Whale	●	●	●	●	●	●			
	Minke Whale									

Source: Prepared by Alaska OCS Office, 1979.

FOOD MATRIX – WHALES

TABLE II.B.6.-1.

FOOD SPECIES																																																				
Boarfish	Capelin	Cisco	Cod	Cuttlefish	Herring	Lantern fish	Pike	Rag-fish	Rockfish	Salmon	Sand lance	Sardines	Saury	Sea lamprey	Smelt	Tuna	Whiting	Acanthostepheia malmgreni	Ampelisca macrocephala	Anonyx	Atylus bruggeni	Calanus cristatus	Calanus finmardicus	Calanus plumchrus	Calanus tonsus	Copepoda	Crayfish	Crustaceans	Diastylis bidentata	Dulichia knipowitschi	Euphausia pacifica	Euphausiids	Hippomedon abyssi	Hippomedon minusculus	Holothuroidea	Ischyrocerus latipes	Meganyctiphanes	Metridia lucens	Nereid Worms	Octopus	Orchomene minuta	Paraphoxus milleri	Phallusia	Pleustes	Polychaetes	Protomedeia grandimana	Salpa	Squid	Thysanoessa inermis	Thysanoessa longipes	Thysanoessa raschii	Thysanoessa spinifera	Eel grass-Zostera Spp.
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COVERAGE DIAGRAM FOR BLM
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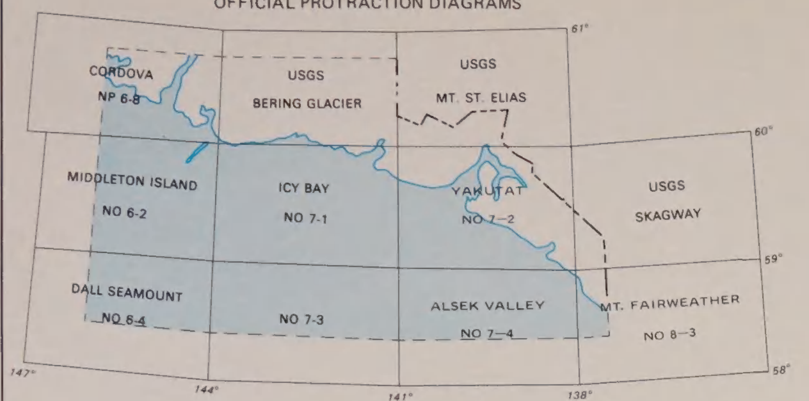


LOCATION MAP

Alaska Outer Continental Shelf Office

EASTERN GULF OF ALASKA

Sale No. 55

Bureau of Land Management
Library
Denver Service Center

GRAPHIC NO. 9

CULTURAL RESOURCES

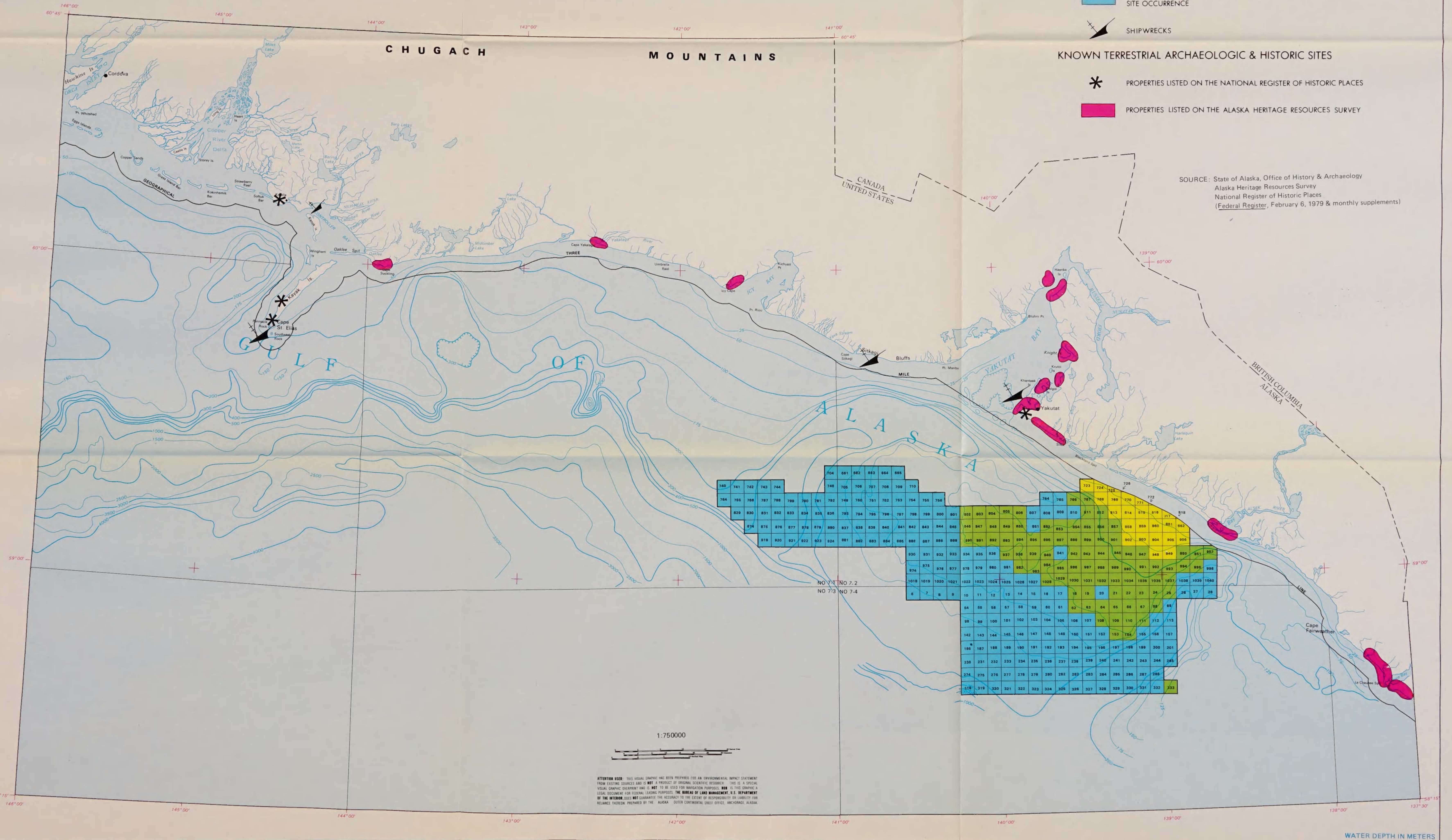
POTENTIAL SUBMERGED ARCHAEOLOGIC SITES

🟨	AREAS EXHIBITING HIGH PROBABILITY FOR ARCHAEOLOGICAL SITE OCCURRENCE
🟩	AREAS EXHIBITING MEDIUM PROBABILITY FOR ARCHAEOLOGICAL SITE OCCURRENCE
🟦	AREAS EXHIBITING LOW PROBABILITY FOR ARCHAEOLOGICAL SITE OCCURRENCE
➹	SHIPWRECKS

KNOWN TERRESTRIAL ARCHAEOLOGIC & HISTORIC SITES

*	PROPERTIES LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES
🟪	PROPERTIES LISTED ON THE ALASKA HERITAGE RESOURCES SURVEY

SOURCE: State of Alaska, Office of History & Archaeology
Alaska Heritage Resources Survey
National Register of Historic Places
(Federal Register, February 6, 1979 & monthly supplements)



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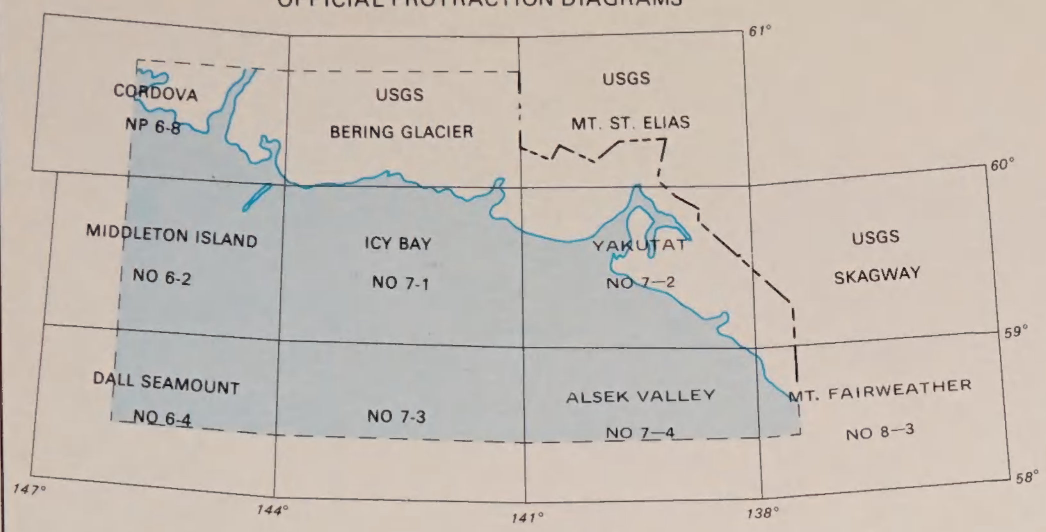
COVERAGE DIAGRAM FOR BLM
OFFICIAL PROTRACTION DIAGRAMS



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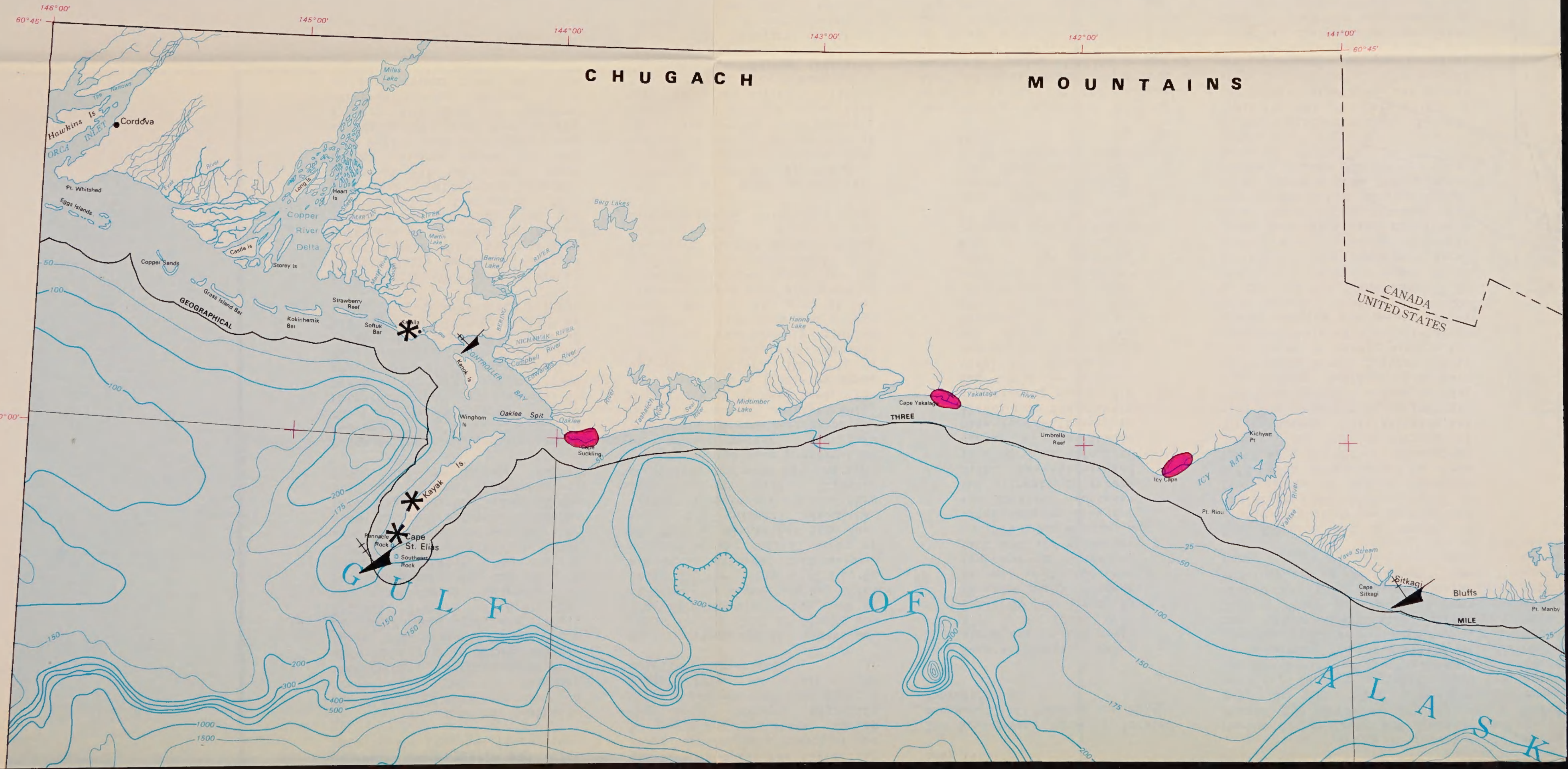

#6139005 ID: 88076077 TD195.P4 A434 1980 v.2

DEPARTMENT OF THE INTERIOR
UREAU OF LAND MANAGEMENT

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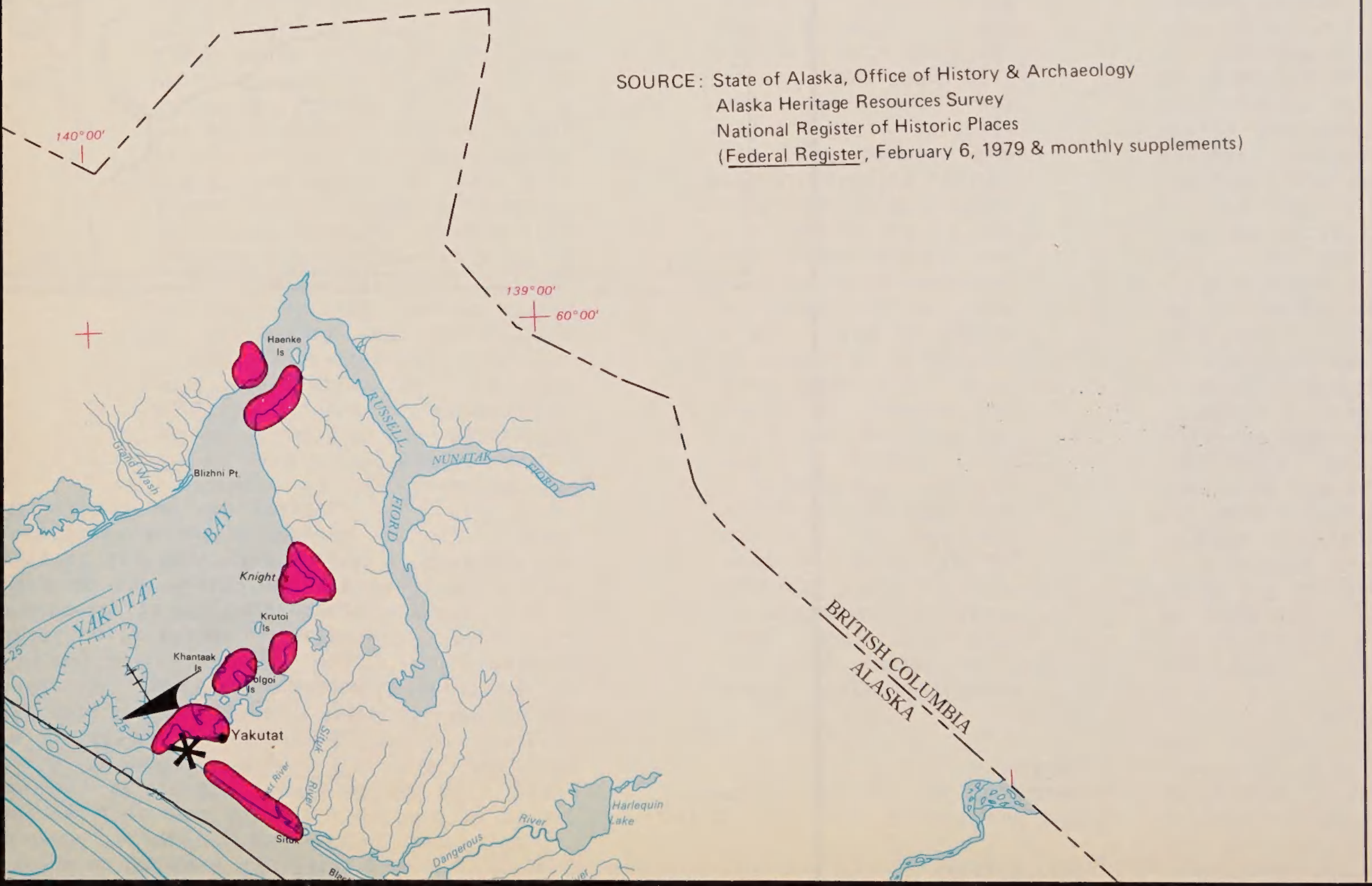

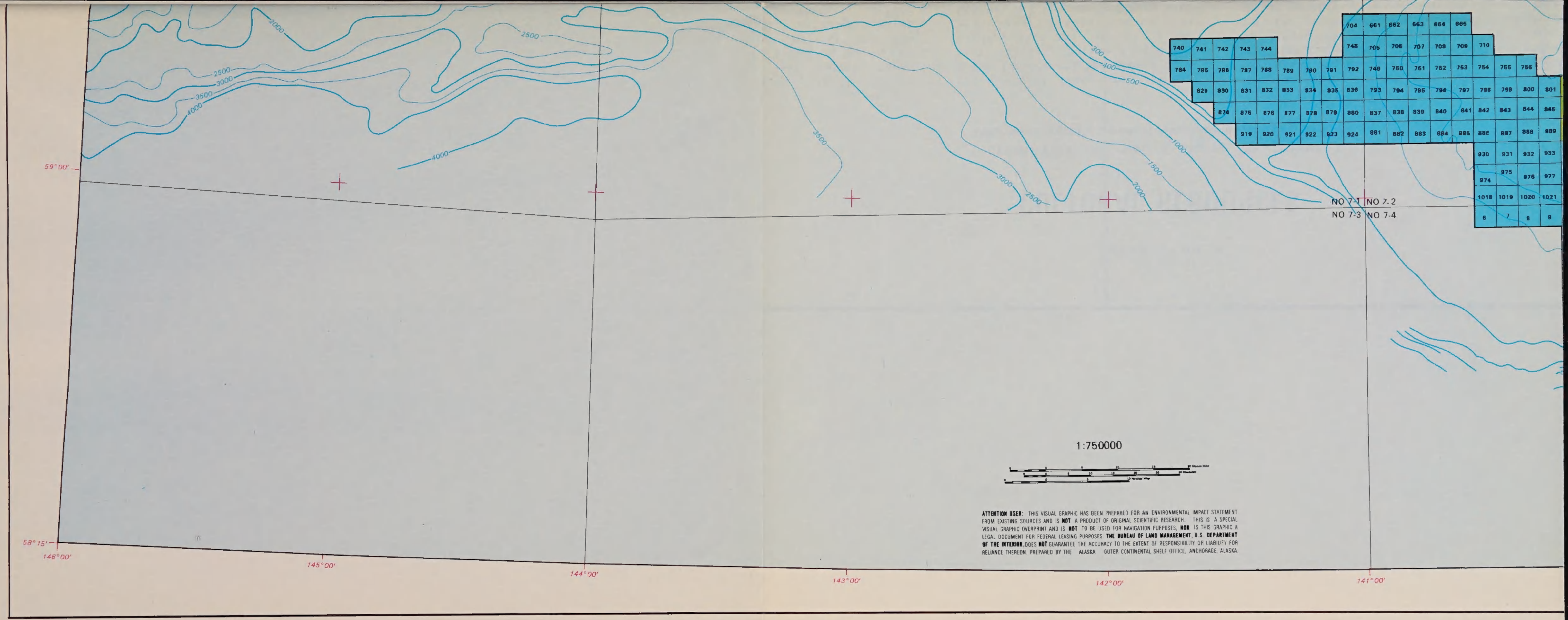

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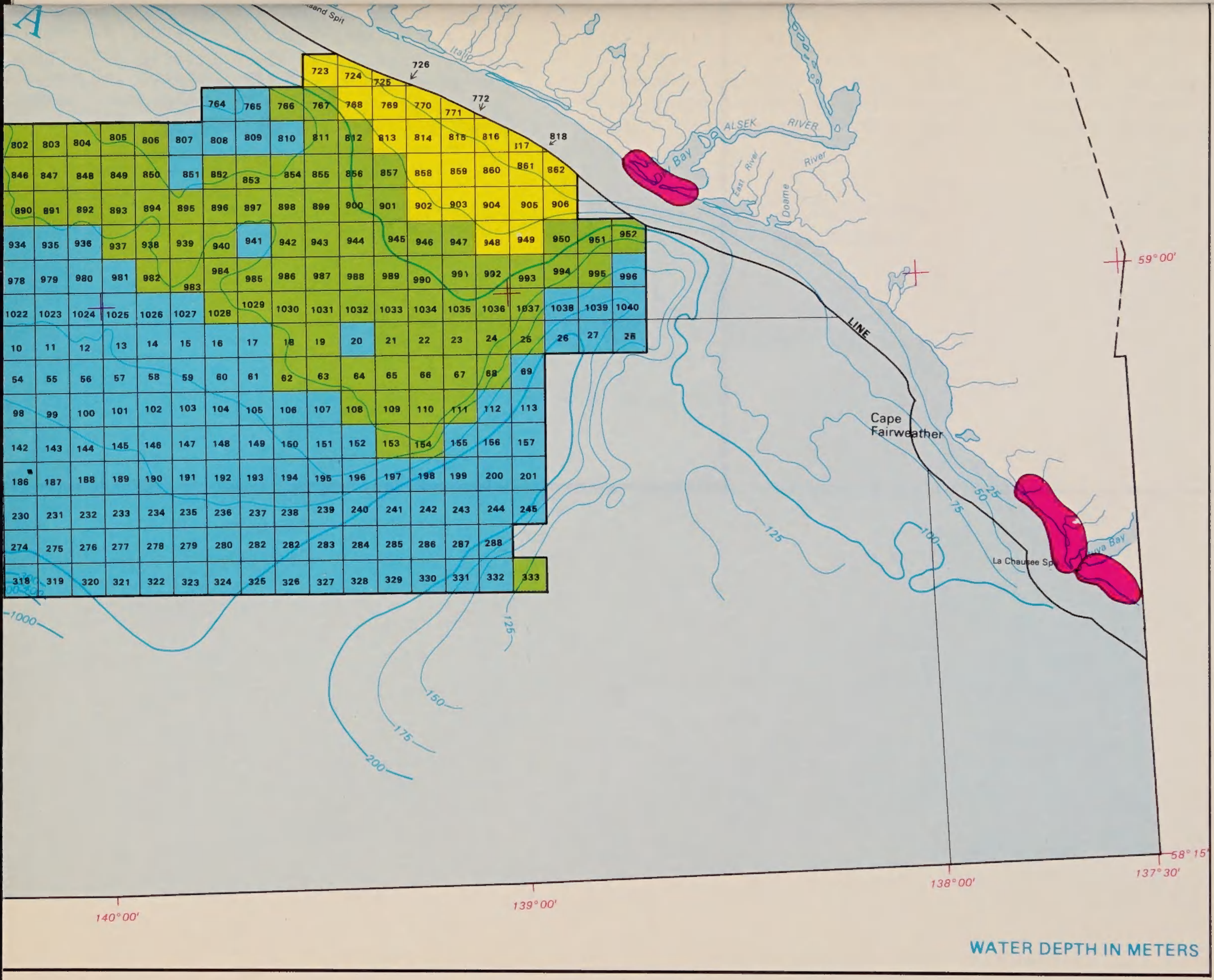
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WATER DEPTH IN METERS

GRAPHIC NO. 9

CULTURAL RESOURCES

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of Social and Economic Components of the Affected Environment

II.C.3.
Cultural Resources

The following describes the cultural context and the terrestrial and marine historic and archaeologic sites within and adjacent to the proposed lease area.

a. Cultural Context: The Gulf of Alaska represents a transitional zone of cultural inhabitants. Cultures associated with this region during prehistoric and historic times were Pacific Eskimo, Eyak, and Tlingit Indians (figure II.C.4.a.-1). The easternmost subgroup of Pacific Eskimo was the Chugach (Josephson, 1974). The Chugach occupied the Prince William Sound area to Cordova and possibly beyond to the offshore islands, including Middleton Island in the Gulf of Alaska (Birket-Smith, 1953, and de Laguna, 1956).

Vitus Bering, who is given credit for making the first landfall in the New World, first visited Chugach territory in 1541. G. W. Steller, the German naturalist on that expedition, saw probable Chugach hunting camps along Kayak Island, but inhabitants fled at his approach (Golder, 1922-25 as cited by Birket-Smith, 1953).

Eyak origins and territory are in doubt. Early explorers confused these people with their Eskimo neighbors to the west, the Yakutat Tlingits to the east, and the Athabaskans to the north. They were even considered as culminations of all the above. More recent authors agree that the Eyak were a distinct tribal group in prehistoric times representing a very old phase of northern northwest coastal cultures. Only in more recent times were the Eyak influenced by the Eskimo and Tlingit (Bandi, 1972). Their general territory was the coastal area east of Cordova to just west of Icy Bay. Those whose territory was west of Icy Bay to the eastern edge of the Copper River Delta had main settlements at Cape Yakataga, Kaliakh River, and the Bering River in Controller Bay. The rest occupied the Copper River Delta and Cordova. In very early times the Eyak people may have inhabited all the northern Tlingit areas (de Laguna, et al., 1964).

The Yakutat Tlingits are the most northerly of the northwest coast Indian cultures. In the latter part of the 18th century, these people lived from Dry Bay to the western shore of Icy Bay (de Laguna, 1972). Although Yakutat people are now Tlingit, earlier inhabitants spoke the Kayak language, apparently a branch of the Na Dene linguistic stock. During the 18th century, migrating Tlingit Indians from southeastern Alaska began to replace the existing Eyak culture.

Most archaeological investigations in the Gulf of Alaska are limited primarily to the work of Frederica de Laguna and Kaj Birket-Smith in the early 1930's. It has been estimated that only 2 percent of the coastal areas of the Gulf of Alaska has been surveyed for cultural resources. Various factors account for this small survey level. Climatic conditions are very wet and contribute to the poor preservation of organic matter. The lush vegetation in some regions of the coast is almost uninhabitable, making surveying very hard. The acid soils leave little evidence of bone material. The area is geologically complex; tectonic forces are continuously creating changes in land form and elevation. Much of the area is believed to have been glaciated as recently as 10,500 years ago. In general, it is logistically difficult to conduct archaeological reconnaissance and surveys in the northeastern Gulf of Alaska area.

b. Known Terrestrial Archaeolgic and Historic Sites: Although extensive surveys have not been conducted on the coastal area adjacent to the proposed lease area, several sites have been identified during the limited field surveys. The Alaska Heritage Resources Survey indicates several historic and archaeologic sites. The majority of these inventoried sites are located in the Yakutat Bay and Lituya Bay areas. The significance of these sites has not as yet been determined. Many of the identified sites will require more extensive surveys to determine significance.

Consultation with the National Register of Historic Places (Federal Register, February 6, 1979, and its monthly supplements) indicates that there are 4 registered properties adjacent to the proposed lease area. These sites include the New Russia site near Yakutat, Bering Expedition Landing site and Cape St. Elias Lighthouse on Kayak Island, and Chilkat Oil Company Refinery site near Katalla.

The New Russia site is located southwest of Yakutat on Phipps Peninsula.

> Russian-Tlingit relations during the years 1796 to 1805 were volatile and marked by sporadic minor incidents as well as by the destruction of Sitka in 1802 and its recapture in 1804. New Russia, a vital staging area for the Russians' successful attempts to retake Sitka, was established in 1796 in an effort to create a more stable base for settlement in Alaska than the existing fur trading posts. It was to be an agricultural and shipbuilding center, but was attacked and burned by the Tlingits in 1805. Before destruction the site consisted of seven buildings with a stockade.... The uprising kept white intruders from the area for nearly a century and today only depressions and subsurface artifacts give evidence of the early occupants. (USDI, 1974).

The Bering Expedition Landing site is located on the western shore of Kayak Island. This site marks the landing of Vitus Bering in the New World. Also located on Kayak Island is the Cape St. Elias Lighthouse. This historic lighthouse is located at the southern tip of the island.

The Chilkat Oil Company Refinery site, located near Katalla, is in Chugach National Forest. The site of the first oil refinery in the State, it was built in 1911, started regular operations in 1912, and continued to operate until 1933 when it was destroyed by fire.

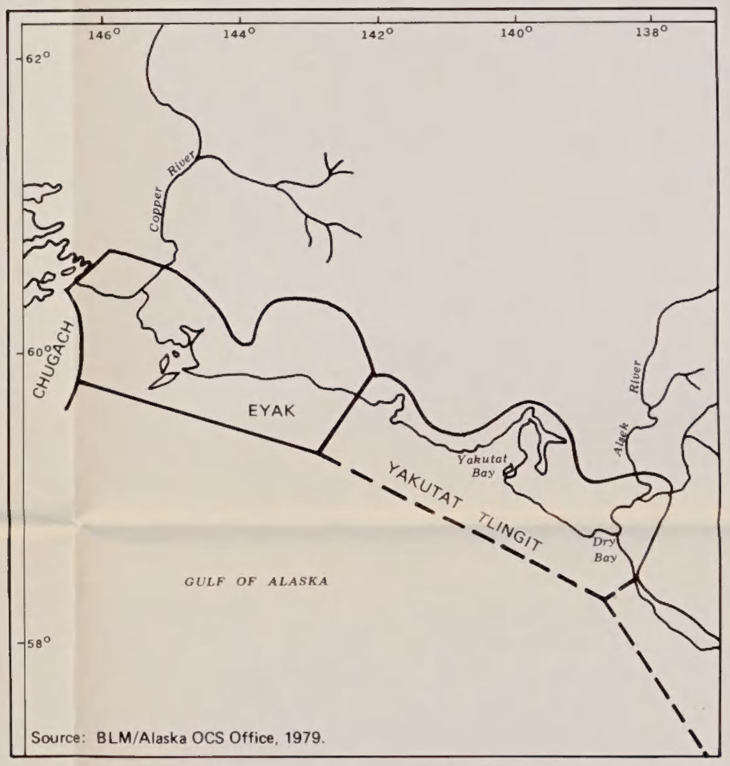
A map depicting the relative concentration of known archaeologic and historic sites, as well as the locations of the National Register properties, may be found on the graphic.

c. Known and Potential Marine Archaeologic and Historic Sites: The BLM/Alaska OCS Office has, in the past, conducted studies, through contracts with the University of Alaska Museum, to determine the probability of archaeological site occurrence on the outer continental shelf. Such a study has not been conducted for that portion of the OCS involved in the proposed lease area.

The decision not to conduct a probability study was made by the BLM/Alaska OCS Office based on the results of several meetings held with representatives from the Alaska OCS Office, Geological Survey, and the University of Alaska Museum. This decision was made due to uplift of marine terrace sequences, sedimentation, and dynamic sediment transport which would either destroy habitation sites or render such sites unrecognizable by state-of-the-art remote sensing equipment (letter from Manager, Alaska OCS Office to Oil and Gas Supervisor [U.S. Geological Survey], dated April 1, 1977). The perceived local historical, glaciological conditions have also been cited as a major impact on the potential for the preservation of habitation sites (letter from Geologist to Manager, Alaska OCS Office, dated March 22, 1977).

A theory which discusses the possibility that the entire OCS in the Gulf of Alaska was not glaciated during the late Wisconsin glacial maximum (Fladmark, 1978) was the basis for a revised approach to the possible determination of probable occurrences of buried submerged offshore cultural resources. The probabilities shown on the graphic were based not only on Fladmark's theory but also on work by McCann, Perez, and Sykes (1979), and minimal offshore geological information. However, recent information as shown on the environmental geology graphic could affect the determination of the probabilities for offshore buried, submerged cultural resources. The probability of archaeological site occurrence is illustrated on the graphic.

Five known ships of historical significance were lost in the northern Gulf of Alaska. All of these sites are located outside of the proposed lease area. The Kayak ran aground near Yakutat at Cape Carrew on December 19, 1913. The famous Alaska gold ship Portland was lost near Katalla on November 12, 1910. The Portland brought the famous ton of gold to Seattle in 1897, thus launching the 1898 gold rush to Alaska. On August 30, 1915, the Alaska Steamship Company's S. S. Edith was lost off Cape St Elias. Another masted schooner is all but covered with sand in the Sitkagi Bluffs area east of Icy Bay. The locations of these known shipwrecks are illustrated on the graphic.



Source: BLM/Alaska OCS Office, 1979.

Figure II.C.4.a.-1. Geographical Location of Northeastern Gulf of Alaska Coastal Native Groups

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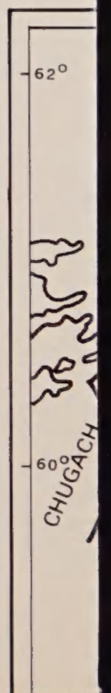

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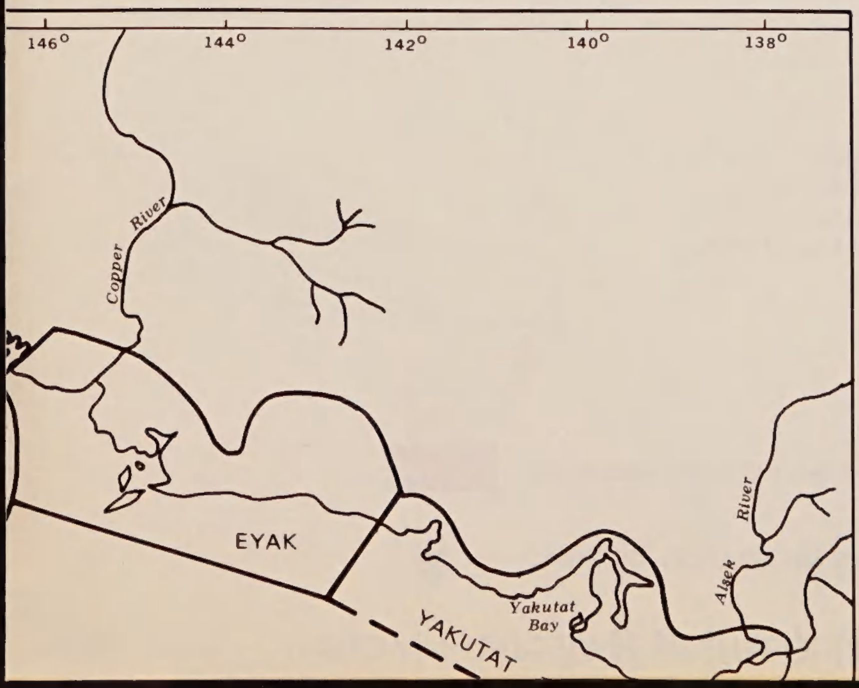

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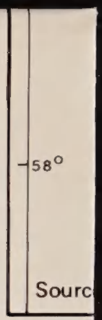

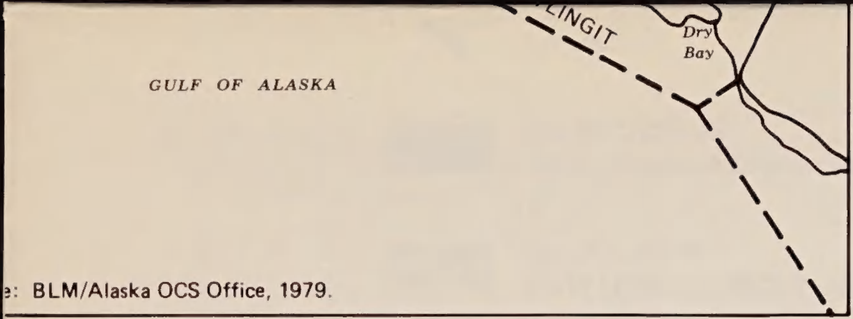

e: BLM/Alaska OCS Office, 1979.

Figure II.C.4.a.-1. Geographical Location of Northeastern Gulf of Alaska Coastal Native Groups

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COVERAGE DIAGRAM FOR BLM
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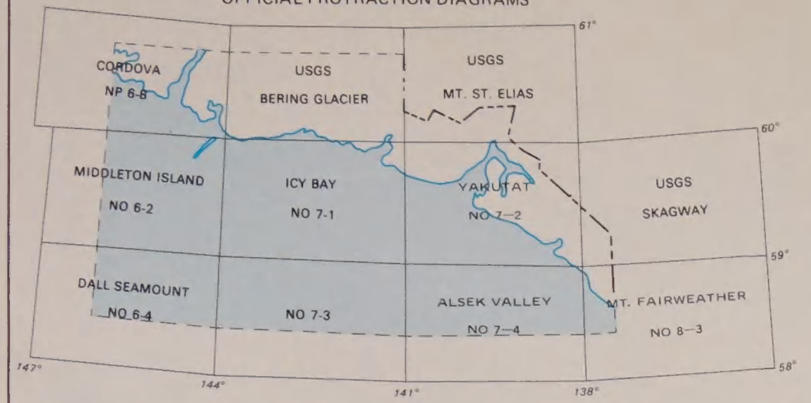

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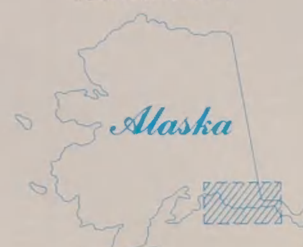
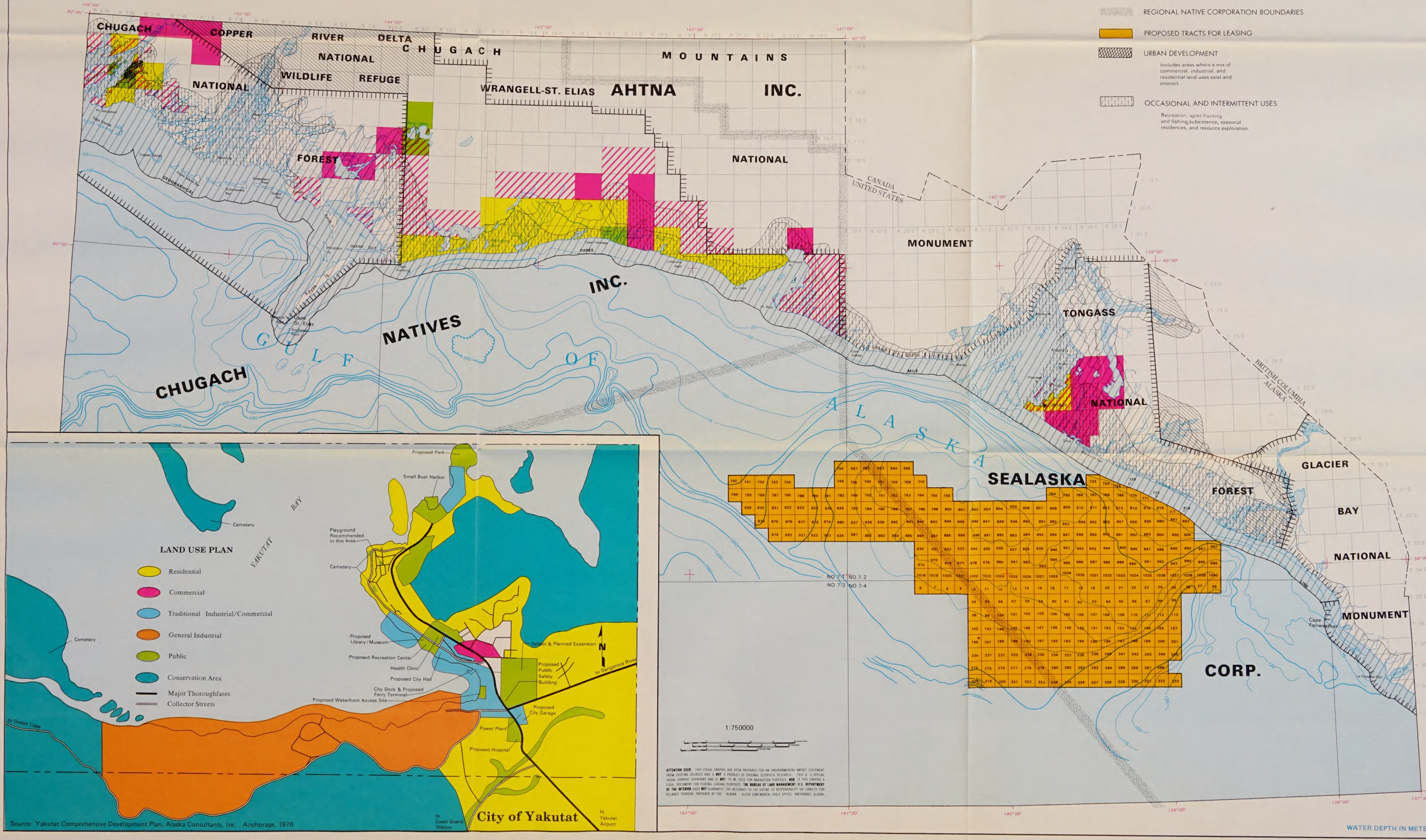


LAND STATUS AND LAND USE

- ▥ PRESENT FEDERAL LANDS
- ▨ WITHDRAWN FEDERAL LANDS
- 🟩 STATE LAND PATENTED
- 🟨 STATE LAND TENTATIVELY APPROVED
- 🟥 STATE LAND SELECTED
- ▨ AREA SUBJECT TO THE ALASKA COASTAL MANAGEMENT PROGRAM
- ▨ NATIVE LAND SELECTIONS
- ▒ REGIONAL NATIVE CORPORATION BOUNDARIES
- 🟧 PROPOSED TRACTS FOR LEASING
- ▩ URBAN DEVELOPMENT
  Includes areas where a mix of commercial, industrial, and residential land uses exist and interact.
- ▥ OCCASIONAL AND INTERMITTENT USES
  Recreation, sport hunting and fishing, subsistence, seasonal residences, and resource exploration.



Source: Yakutat Comprehensive Development Plan, Alaska Consultants, Inc., Anchorage, 1976

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WATER DEPTH IN METERS

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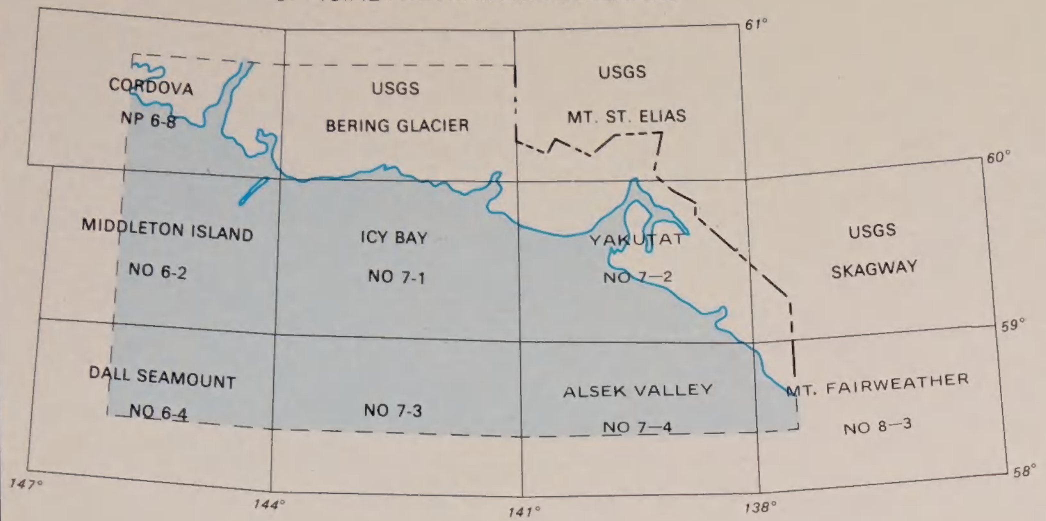

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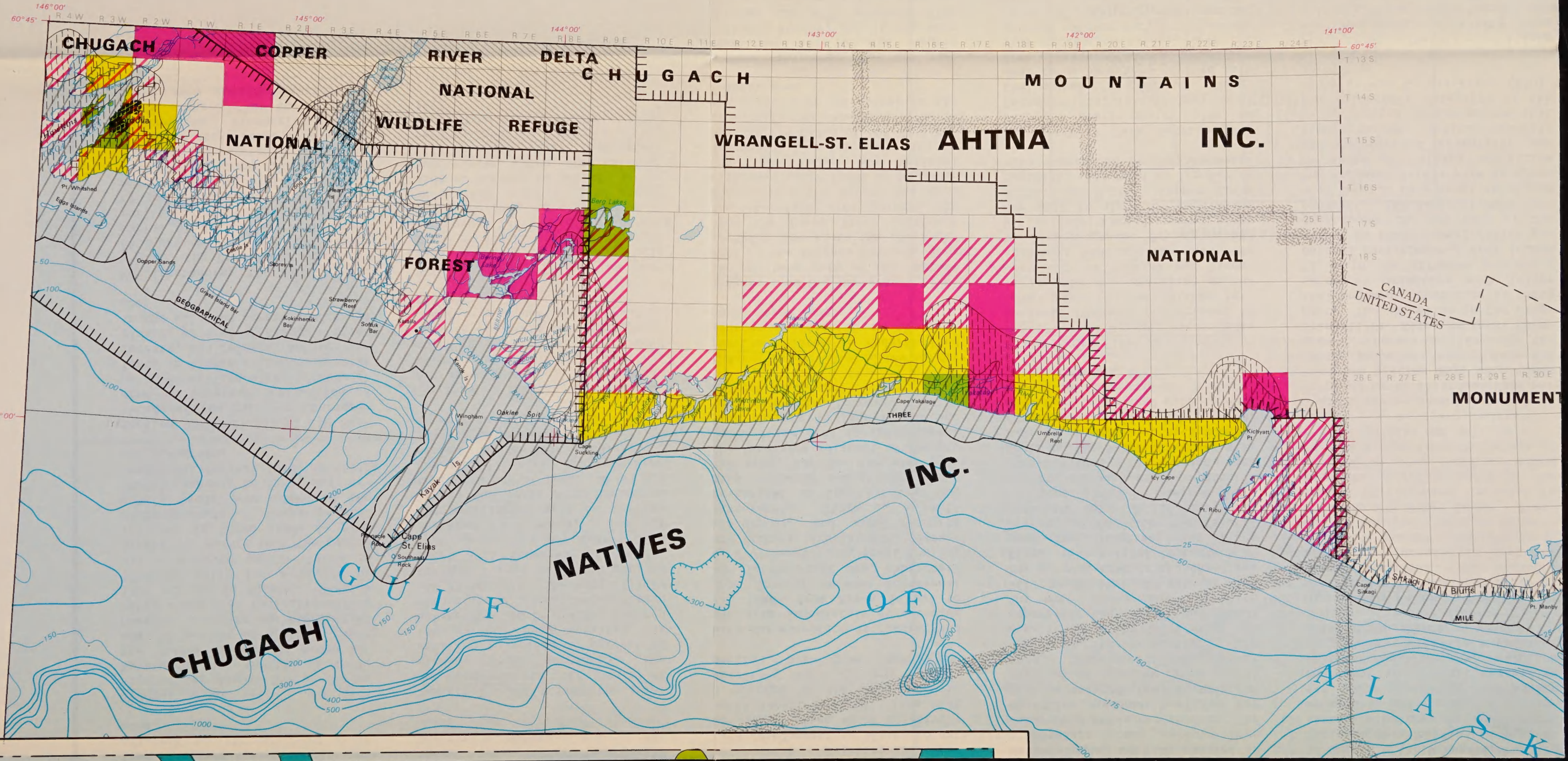

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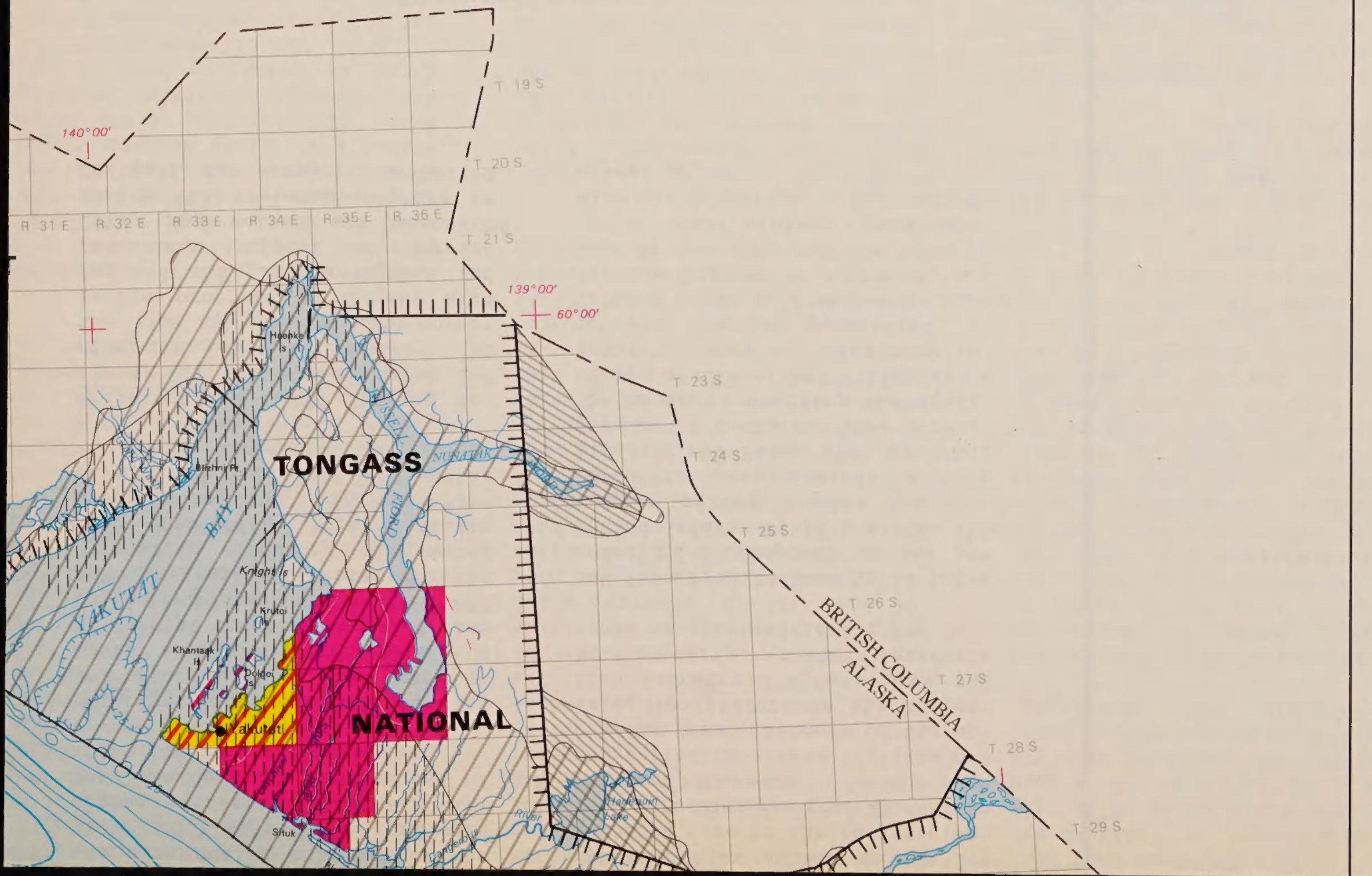
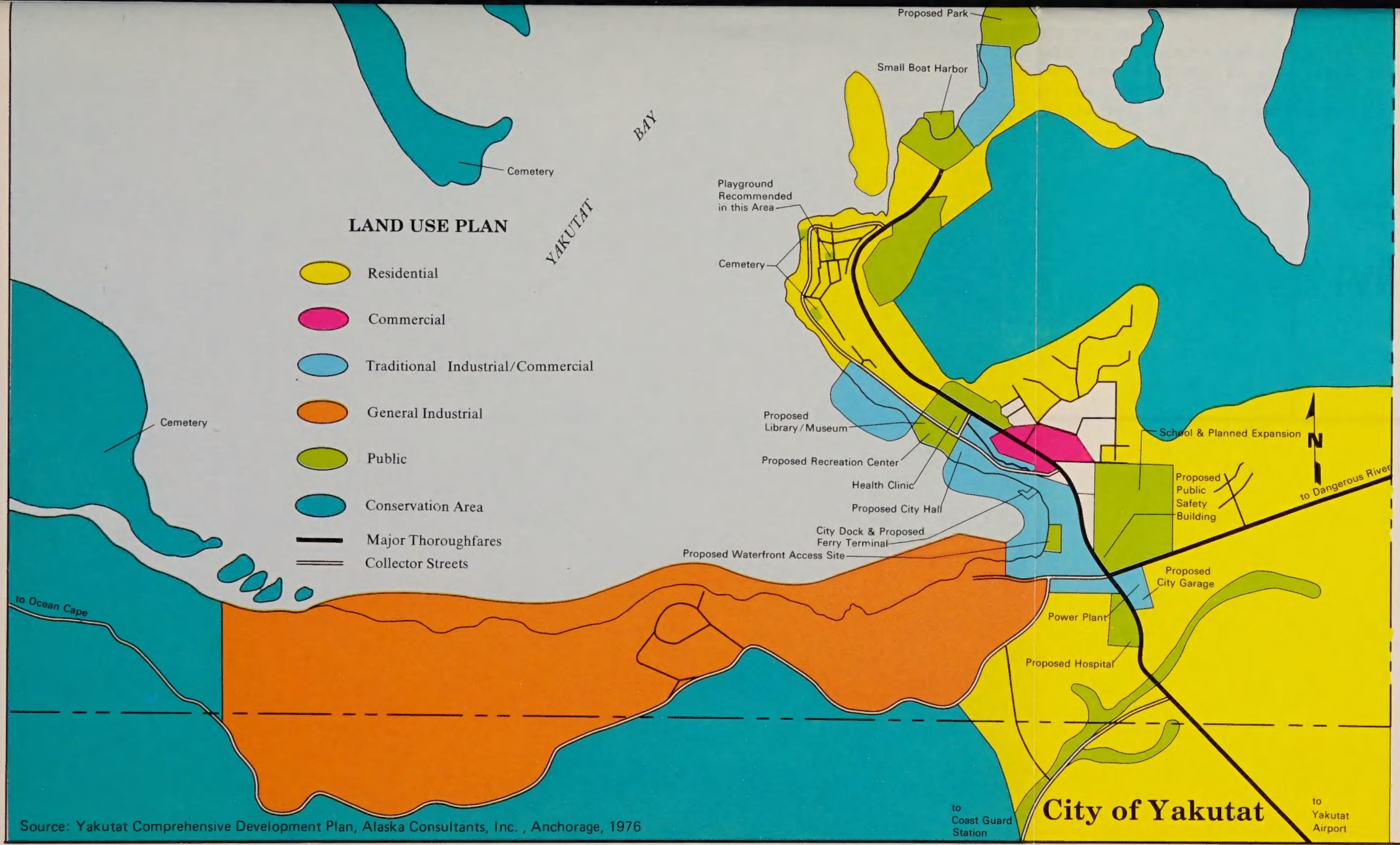
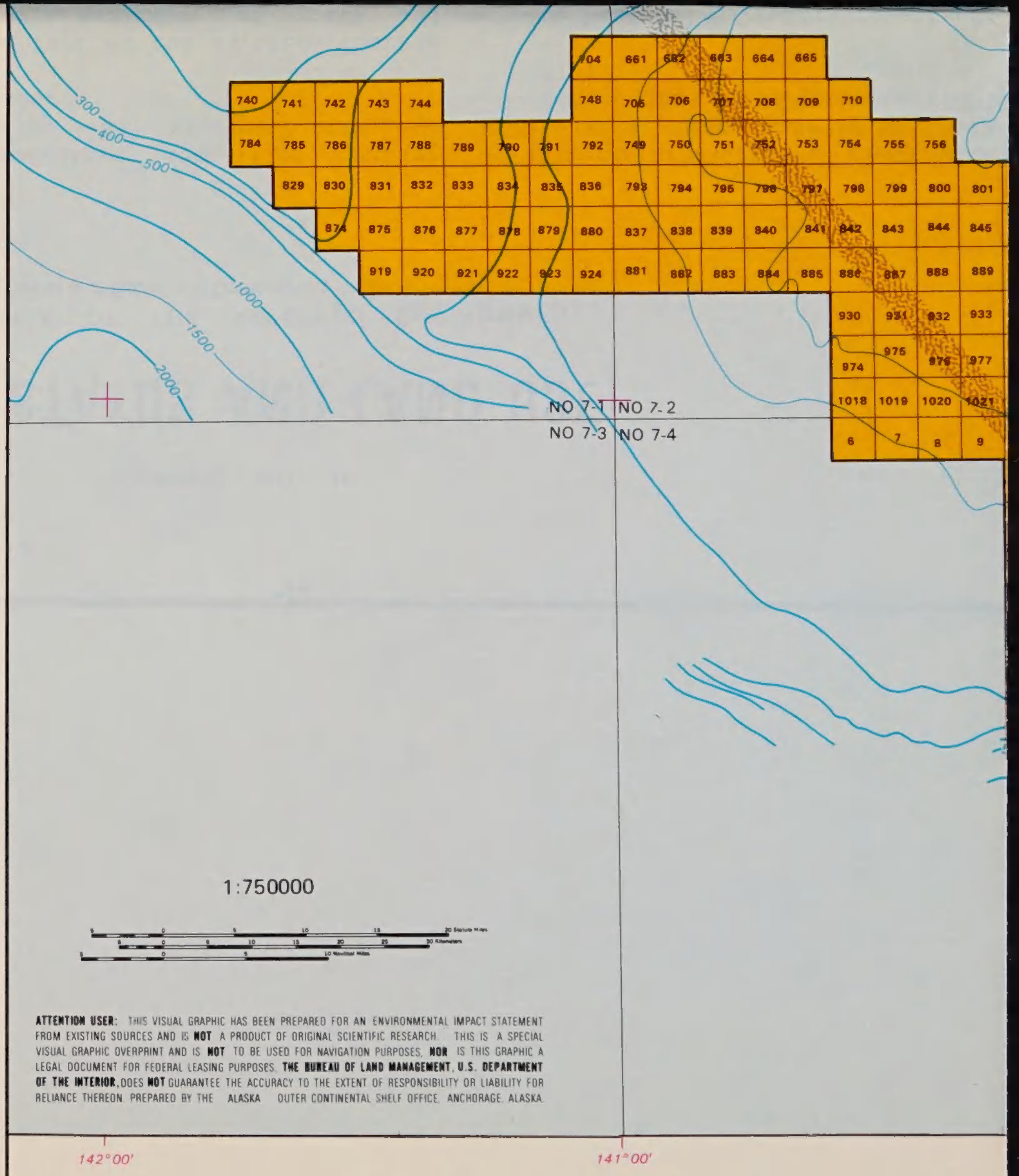




Source: Yakutat Comprehensive Development Plan, Alaska Consultants, Inc., Anchorage, 1976



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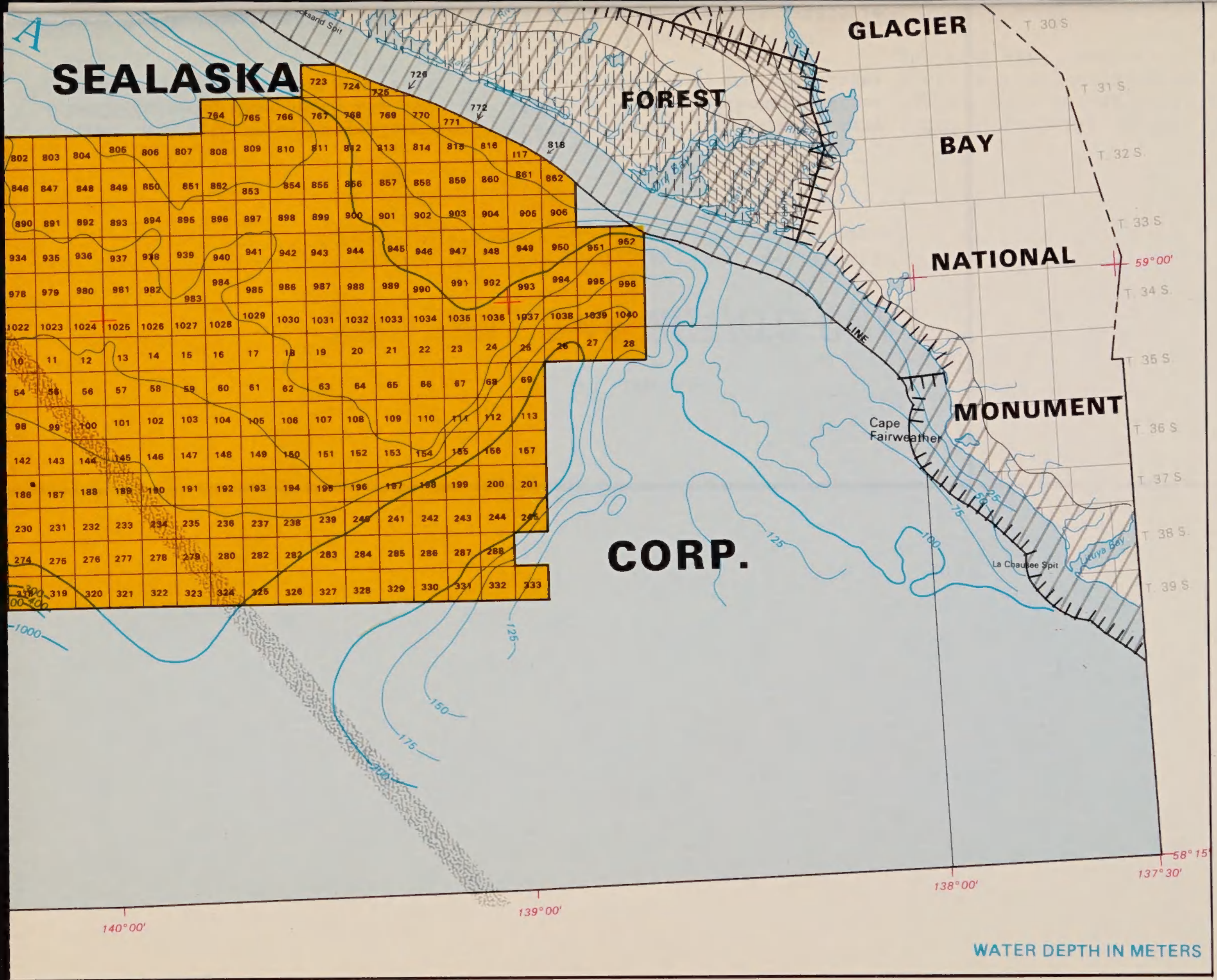
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58° 15'
137° 30'
138° 00'
139° 00'
140° 00'
WATER DEPTH IN METERS

GRAPHIC NO. 10

LAND STATUS AND LAND USE

DESCRIPTION OF THE AFFECTED ENVIRONMENT

Description of Social and Economic Components of the Affected Environment

II.C.7.
Land Status and Land Use

a. Land Status: This section discusses the status of lands adjacent to the proposed lease area.

Federal Lands: Before the passage of the Alaska Native Claims Settlement Act (ANCSA) in 1971, the Federal Government owned almost 90 percent of Alaska. ANCSA, however, contains two significant subsections that radically affect land status in Alaska. Section 17(d)(1) calls for a review of all unreserved public lands in Alaska "to ensure that the public interest in these lands is properly protected." Unappropriated public lands were added to the (d)(1) category in 1974, and currently all Federal lands in Alaska are withdrawn.

Section 17(d)(2) allows the Secretary of the Interior to recommend to Congress designation of up to 80 million acres of Federal lands in Alaska as national parks, forests, and refuges, and for inclusion of some of Alaska's rivers in the wild and scenic rivers system.

Notwithstanding the (d)(2) provision, the President, using the Antiquities Act, and the Secretaries of Agriculture and Interior, using the Federal Land Policy and Management Act (FLPMA), withdrew several million acres of land for inclusion into the 4 Federal preserve systems. These actions are still subject to action by Congress. Presently, Federal lands onshore from the proposed lease area include Glacier Bay National Monument, the northern portion of the Chatham area of the Tongass National Forest, and the newly created Wrangell/St. Elias National Monument.

State Lands: As of January 1979, the State of Alaska had received title to only 22 million acres of the 104 million they are entitled to select under the terms of the Statehood Act. This does not include the submerged lands, tidelands, and lands under the state's navigable lakes and streams. Before ANCSA, state lands totaled about 7 percent of the total land area. When land claims are settled, state lands will total 28 percent of the total land area.

The state has selected lands along the coast between Cape Suckling and Icy Bay, and around Yakutat, but most of these selected lands have only been tentatively approved for conveyance to the state. Present state land around Yakutat encompasses the state-owned and operated airport.

Municipal Lands: From the acreage conveyed to the State of Alaska, local governments are entitled to select 10 percent of the vacant, unappropriated, or unreserved state lands located within their corporate boundaries (AS 29.18.190). The city of Yakutat has a land selection pool of about 59.5 hectares (163 acres) from which they may select 37.6 hectares (103 acres). Some of the entitlement will be used to expand the small boat harbor on the north end of town. About 2.6 hectares (7 acres) has been committed to an ASHA subdivision, leaving 35 hectares (96 acres) to be selected and patented.

The city of Yakutat also owns 73.7 hectares (202 acres) of tidelands within its corporate boundaries, which gives the city an added measure of waterfront development control--a situation not found in many Alaska communities.

Private Lands: Before the passage of ANCSA, privately held lands in Alaska accounted for just 0.3 percent of the total land area. ANCSA provides for conveyances of 40 million acres of land statewide to Natives to satisfy Native land claims, which, when settled, will increase private land ownership to about 11.3 percent of the total land area (Selkregg, 1974; 1976).

Adjacent to the proposed lease area are two areas that have been selected by Native groups. Yak-Tat-Kwaan, Inc., the Yakutat Native Corporation, has received interim conveyance of 73.37 hectares (20,101 acres) from an entitlement of 84.10 hectares (23,040 acres) in and around Yakutat. There are some lands jointly selected in and around Yakutat by the State and Yak-Tat-Kwaan. Also, the Chugach Natives, Inc., the regional corporation covering the area east of and including Prince William Sound, has selected most of the eastern side of Icy Bay, and the gulf shoreline from Icy Bay to 141° W. longitude. Other Native lands in the area lie inland and adjacent to the state selections between Cape Suckling and Icy Bay.

b. Existing Land Use: Land development in Alaska to date has taken place on a relatively small amount of land. Less than 3 percent of the land mass is privately owned and only a small portion has been developed.

With the exception of Yakutat and the area immediately surrounding it, lands from Kayak Island to Cape Spencer receive occasional and intermittent use, characterized by recreation, sport hunting and fishing, subsistence, seasonal residences, and some resource exploration. There is a small settlement at Cape Yakataga and many isolated cabins throughout the area, but for the most part the land area adjacent to the proposed lease area is undeveloped. With changes in land status and land transfers, however, this is subject to change.

Federal Lands: The following discussion relates to Federal land management adjacent to the proposed lease area.

Tongass Land Use Management Plan: The northern part of the Chatham area of the Tongass National Forest includes the shoreline northward from the Doame River (although the shoreline area between the Doame and Alsek Rivers has been withdrawn under FLPMA as an addition to Glacier Bay National Monument), and the east side of Yakutat Bay south of 60° N. latitude, with the exception of Native and state land selections in the Yakutat area.

A land management plan has just been completed for the Tongass National Forest, and it has been through the NEPA process. The entire northern Chatham area has been withdrawn from mineral entry by the Secretary of Agriculture. The Tongass plan also has the following management objectives.

The area adjacent to upper Yakutat Bay, including Russell and Nunatak Fiords, has been proposed as the Russell Fiord wilderness area (LUD I), which would exclude timber harvesting, recreation facilities, use of motorized vehicles, aquaculture facilities, mining (after 1983), water projects, and roads.

The rest of the northern Chatham area, exclusive of state and Native lands, will be managed as a roadless area, except where unimproved roads are in use. The shoreline area north of Dry Bay will be managed to allow maintenance of unimproved roads (vital to the commercial fishing industry) and for recreation. The area south of the Alsek River has important facilities and roads for the fishing industry, which will be maintained, plus a plan for a river trail along the Alsek River. The coastal lowlands between the Dangerous and Alsek Rivers (along with the Yakutat area, the only LUD III lands near the coast) will be managed for a variety of uses with no general prohibitions. The upland area north of the Dangerous River will have as an emphasis, back country development. The Situk River area will be managed with a heavy recreation emphasis (U.S. Dept. of Agriculture, 1979).

Wrangell/St. Elias National Monument: The Wrangell/St. Elias National Monument was created in 1978 under the Antiquities Act. It includes the shoreline on the west side of Yakutat and Disenchantment Bays and the east side of Disenchantment Bay above 60° N. latitude, extending west along the gulf to the line separating R.25E. and R.26E., Copper River Meridian. The head of Icy Bay is also surrounded by the monument.

The National Park Service prepared a draft master plan in December 1973, in anticipation of the monument's creation. Monument lands have been divided into five classes: class I, high density recreation areas; class II, general outdoor recreation areas; class III, natural environmental areas; class IV, outstanding natural areas; and class V, primitive areas. The part of the monument adjacent to the Gulf of Alaska and Yakutat Bay is mostly classes IV and V. Class IV lands are characterized by "unique or outstanding natural features, are as of high wildlife or scientific significance, major geologic features, or particular features of the park . . . ." Class V lands are roadless and completely natural areas that, along with class IV areas, make up the back country within the monument (USDI, 1973).

The National Park Service intends to maintain the Wrangell/St. Elias National Monument in its present state, allowing the continuance of natural and ecological processes while providing for public enjoyment and outdoor recreation that is compatible with retention of park ecosystems in a pristine state (USDI, 1973).

Glacier Bay National Monument: Glacier Bay National Monument was created in 1925. The monument originally included in part the shoreline and the submerged lands out to 3 miles from Cape Spencer north to Sea Otter Creek. Presently, the monument includes in part the shoreline north to the Doame River area, which was added in 1978 by the President's use of the Antiquities Act.

A draft master plan has also been prepared by the National Park Service for Glacier Bay, with lands in the monument divided into the same 5 classes as lands in the Wrangell/St. Elias National Monument. The shoreline in the original monument boundaries is designated as primitive area (class V), with the offshore portion a natural environmental area (class III). No land classification yet exists for the new part of the monument. The National Park Service intends to attempt to change the monument into a park in order to phase out mining activities and to protect scientific and scenic values. Visitor use will be encouraged to the extent that the wilderness integrity of the monument can be preserved (USDI, 1974).

State Lands: The State of Alaska has management authority over selected lands in the Yakutat area and along the gulf, even though they have only received tentative approval of their selections. However, the state has no specific management plans for these areas.

According to the Alaska Department of Natural Resources, the area along the gulf has some oil and gas potential, and, in fact, a few permits have been issued for exploratory drilling in the area. Also, there are some forest lands in this area, with the potential for recreation and logging.

Much of the land around Yakutat has been dually selected by the state and Yak-Tat-Kwaan, and once claims are settled, Yakutat will get 37.6 hectares (103 acres) of state lands in the area.

Municipal Lands: Yakutat's land selections will be used for community expansion, which will occur if Yakutat becomes a service base (estimated peak population, 1,608) and/or a regional center for the bottomfish industry (estimated 1996 population, 1,119) (Alaska Consultants, Inc., 1978). A proposed land use plan for Yakutat is shown above in the inset.

Private Lands: The Chugach Natives, Inc. has several ideas for using its land on Icy Bay. At the time of sale 39, the corporation proposed a staging area for oil and gas development and production support on Moraine Cove. When nothing was discovered during the exploration phase in the gulf, the corporation shelved the proposal. The proposal may still be viable, although most of the present lease area is closer to Yakutat.

The Chugach Natives, Inc. also is interested in tourism in the Icy Bay area, due to the recent creation of the Wrangell/St. Elias National Monument. It is also interested in a floating fish processing plant, because of the upswing in interest in the bottomfish industry. With a dock and an airstrip, these interests could be accommodated at Icy Bay.

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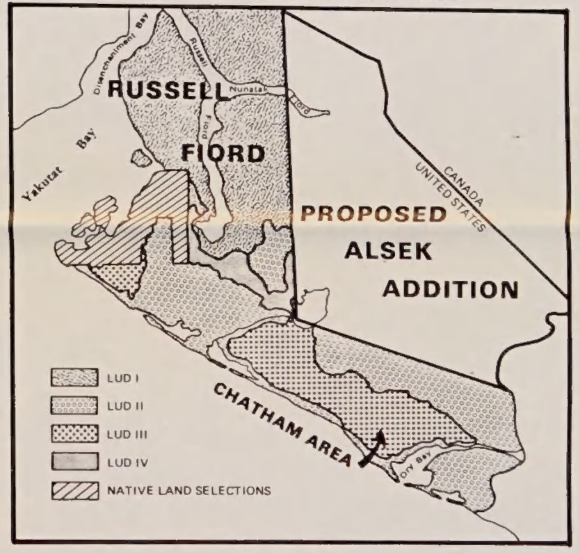
CHATHAM AREA/
TONGASS NATIONAL FOREST



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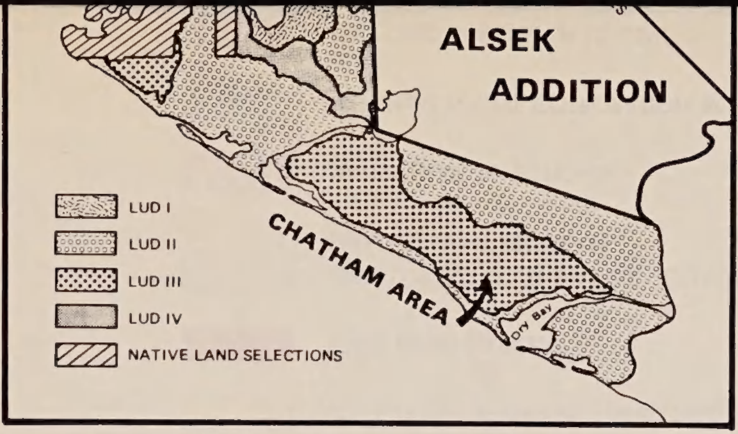
ALSEK
ADDITION
LUD I
LUD II
LUD III
LUD IV
NATIVE LAND SELECTIONS
CHATHAM AREA
Dry Bay

Bureau of Land Management
Library
Denver Service Center

BLM Library
Denver Federal Center
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P.O. Box 25047
Denver, CO 80225